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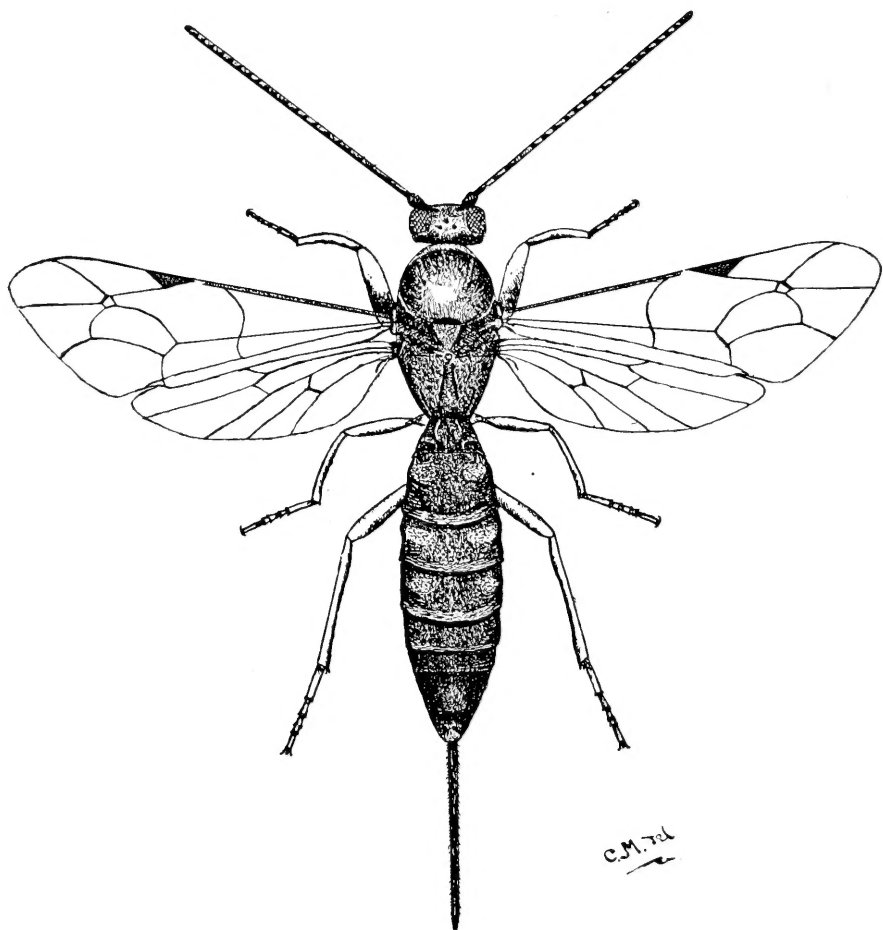
BRITISH ICHNEUMONS

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PIMPLINAE.







*Pimpla robusta*, *Morl.*, ♀.

# Ichneumonologia Britannica, iii.

THE

## ICHNEUMONS OF GREAT BRITAIN

A DESCRIPTIVE ACCOUNT OF THE FAMILIES, GENERA AND SPECIES  
INDIGENOUS TO THE BRITISH ISLES, TOGETHER WITH NOTES AS TO  
CLASSIFICATION, LOCALITIES, HABITATS, HOSTS, ETC.

BY

CLAUDE MORLEY, F.E.S.

Author of "The Hymenoptera of Suffolk"

"Ichneumoninae of Britain"

"Cryptinae of Britain"

etc., etc.

### PIMPLINAE.

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Finis creationis telluris est gloria Dei ex opere naturae per hominem solum.—LINN.

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MCMVIII,



## PREFACE.

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The Ichneumonids contained in the present volume are without doubt the easiest to identify of any occurring in Britain; and the beginner in this branch of the Insecta will consequently do well to study them first, before going on to the more abstruse and difficult divisions of Ichneumonidae. The genera are, almost without exception, very definitely defined and the species fall into tolerably natural sequence. This group is further to be urged as the easiest introduction to our subject as a whole on account of the abundance of the species comprised in it: of our two hundred and eleven British species there are but forty that I do not possess in my own collection, after no more than ten years collecting. The Cryptinae are almost equally ubiquitous, but in its case the species are so difficult to distinguish and in fact appear to so gradually and imperceptibly merge into each other that facility of determination is restricted to but a comparatively few of the larger and more conspicuous kinds. Moreover compared with the numerical superiority of the British representatives, they must yield to the present group; for in the same length of time I have only been enabled to amass 233 species. The very great similarity between species and dissimilarity between the sexes of the same kind are the principal drawbacks to the study of Ichneumonidae; often one finds authors arbitrarily associating as sexes of the same, insects which have no more right to be treated as specifically identical than that which is afforded by the more or less analogous exoskeleton. Unfortunately this method is unavoidable (and I am guilty of it myself) unless one is content to multiply the number of species by giving sexual names, as Förster has so frequently, to insects whose relationship is not established. But, as Shuckard very truly says (Foss. Hym. 159), "Nature is too Protean to be bodiced" by any hard and fast lines or rules; and in the case of the Ichneumonidae copulation is so rarely witnessed—I have seen but two instances—that this basis of a knowledge of sexual affinities is practically denied us.

I may, perhaps, be allowed to take this opportunity of entering a strong protest against the barbarous modern Continental practice of applying an entirely new name to a well-known species when it is discovered that the original author had before him at the time of drawing up his description several individuals of what are now considered, or known, to be distinct species. There is, doubtless, something to be said in favour of the practice: if types are inaccessible, it may be impossible to decide from the description alone to which of your species to apply the name: a part may apply only to one, other parts only to another of your distinct insects. Such is, of course, extremely confusing, and the simplest expedient is undoubtedly to redescribe the whole. But Science is not founded on simplest methods to oneself, which are more than likely to lead to increased bewilderment to others, and throw our predecessors into oblivion. The law of Priority decrees that the first name to which a recognisable description is attached shall stand, and more especially so if the type specimen be extant for examination. If the description apply impartially to several latter-day species, the first specimen in the author's series must be regarded as the type, unless such should be especially indicated (as in Desvignes' collection), which is rarely the case in the cabinets of the older authors. The fact that you are personally unable to examine the type is no valid excuse for disregarding it; and, in Britain, we shall have yet less excuse if Mr. Waterhouse's scheme for a subtype collection be carried out\*. If the description be avowedly drawn from a number of specimens, which differ *inter se* to some extent, but not, in the opinion of the original author, sufficiently to entitle them to specific rank, the first of these must be regarded as the type, and those parts of the description referring to it retained as typical. Thomson is, perhaps, the worst exponent of this new-old species system, and is followed by Kriechbaumer; even Schmiedeknecht errs in the same direction. Thomson's *Odontomerus* and Kriechbaumer's bifurcate *Ischnoceros* are cases in point; the former doubtless needs dividing into several species, but these I will not accept till we know the original. If we agree to reinstate Scopoli's *Pimpla inquisitor* in place of *P. stercorator*, on the sole strength of specimens in his collection—the description being obviously inadequate—surely it is invidious to erect new names for insects, the old ones of which can as easily be confirmed. It is not necessary to point out to what a

\* Cf. Presidential Address read before the Entomological Society of London, 1908.



curious condition this objectionable practice will lead Entomology:—every one, almost without exception, of the old names must disappear and hence modern authors will have a broad blank roll of honour upon which to inscribe their names, if they combine to consider all the labours of the last hundred and fifty years as worthless (as has recently been most deplorably done by M. l'Abbé J. J. Kieffer in his maltreatment of the European Proctotrypidæ). If justice is to be done to the Founders of our Science, let us take more pains to examine type specimens, and render honour where honour is due. The honour of describing a presumably new insect is certainly small enough; yet it shows at least some association with Nature, which many of us, like Shelley, regard as an honour indeed.

In the compilation of this volume I have had the advantage of assistance from a great number of most kind correspondents, and it is with considerable pleasure that I here render my thanks to Miss E. M. Alderson, F. C. Adams, R. Adkin, Rev. C. D. Ash, E. A. Atmore, E. R. Banks, E. G. Bayford, the late A. Beaumont, E. C. Bedwell, G. C. Bignell, Col. C. T. Bingham, Kenneth Blair, Rev. E. N. Bloomfield, A. C. Bowdler, R. C. Bradley, E. Brunetti, Malcolm Burr, E. A. Butler, Rosse and Ruskin Butterfield, Prof. J. W. Carr, Campbell Taylor, Dr. R. T. Cassal, Dr. Chapman, H. J. Charbonnier, Miss E. Chawner, A. J. Chitty, W. M. Christy, W. G. Clutten, E. A. Cockayne, J. W. Cross, G. W. Dale, A. A. Dalglish, C. H. Davies, F. H. Day, W. Duncan, Horace Donisthorpe, H. M. Edelsten, Stanley Edwards, Ernest A. Elliott, Willoughby Ellis, W. W. Esam, W. Evans, E. A. Fitch, G. E. Frisby, J. G. Gordon, Rev. H. S. Gorham, J. C. Haggart, A. H. Hamm, Selwyn Image, O. E. Janson, Rev. W. F. Johnson, Rev. A. Jourdain, J. H. Keys, J. W. Lucas, A. W. Luff, G. F. Lyle, Dr. MacDougall, J. R. Malloch, A. H. Martineau, Frank Morey, Rev. F. D. Morice, G. W. Mason, J. F. Musham, B. G. Nevinson, E. A. Newbery, Lieut.-Col. Chas. Nurse, F. H. Peachell, Rev. O. Pickard-Cambridge, Albert Piffard, C. J. Pool, G. T. Porritt, P. C. Reid, N. M. Richardson, W. D. Roebuck, A. Roman, Hon. N. C. Rothschild, G. B. Routledge, E. Saunders, E. Shaw, A. Sich, F. W. Sladen, E. G. J. Sparke, R. South, Rev. A. Thornley, B. Tomlin, W. H. Tuck, H. J. Turner, C. J. Wainwright, J. Waterston, F. J. Whittle, Col. J. W. Yerbury.

The National Collection of Ichneumonidae will probably be shortly rearranged.

CLAUDE MORLEY.

MONKS' SOHAM HOUSE, SUFFOLK,

*May 1st, 1907.*

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## INTRODUCTION.



As might have been expected in the case of so large and conspicuous insects as are many of those treated of in the present volume, the Pimplinae were among the earliest of the Ichneumonidae to attract the attention of naturalists and we have references to them in Aristotle's History of Animals, and our own countryman Thomas Mouflet described at least two of them as early as 1634. There are, also, many other observations of pre-Linnean authors, though unfortunately the majority are too vague to enable us nowadays to refer them to individual species. In Britain, Donovan records several of the larger kinds at the end of the eighteenth century and Marsham gives us a capital account of one species, which is hardly yet identified, in 1797. Stephens' Illustrations fail us in this subfamily, excepting for one or two kinds figured in his Supplement; but Curtis has several plates dealing with them in his ever useful British Entomology. The first at all reliable Catalogue is that of Desvignes, published in 1856, and in it we find the number of indigenous kinds placed at little over one hundred, though many were added in 1870, in Marshall's Catalogus; and the same author's Catalogue of 1872 brought the total for Britain to one hundred and fifty-four species. It is unfortunate that Bridgman and Fitch's excellent Introductory Papers did not reach the Pimplinae at all; since the consequence is that we have hitherto had actually no reliable account whatever in English of this group, though Bridgman added several species to our catalogue in 1881-89 and described a fair number which he considered to be new to Science; these with others previously brought forward by Desvignes and about the same time by Capron and Bignell, left the total at one hundred and ninety-nine British species in 1899. A few of them were, however, no more than synonyms and the Banchides were, as placed by Holmgren, at that time regarded as constituting an aberrant group of the Ophioninae. By including the latter in the present volume, synonymizing some of those already included under distinct names and bringing forward eight new kinds, the present total of our Fauna stands at two hundred and eleven different species, which probably much more fully represents the Pimplinae of our Islands than do the totals of the Cryptinae and Ichneumoninae in my two former volumes,



The smaller number of species necessary to be treated of in the present volume has enabled me to devote more space to the consideration of their economy, and the insertion of details *in extenso* concerning it. A consideration of this, which is a great deal fuller account of the kind than has before been brought together, will enable us to form some very interesting though hardly conclusive theories upon the range of parasitism of any given species, a most fascinating subject, first treated of from the hosts point of view by Mr. Ernest A. Elliott and myself in a recent volume of the Transactions of the Entomological Society (if we except the useful, but bare, list of names in Buckler's "Larvae"). Any hypothesis on the subject must be based upon the material available, and the greatest care should, consequently, be employed in notifying the degree of certainty whenever a parasite be recorded as emerging from a specified host; since it is only too easy to suppose that *Lissonota distincta* had preyed upon *Orchesia micans* larvae, which had been seen in a fungus, when in reality it had emerged from those of one of the fungus-feeding Lepidoptera, which had escaped observation, unless the dead larva-skins be discovered and recognised. Many, very many, of Ratzeburg's innumerable records err in this manner—in being too superficial—and will ere long be confuted; nevertheless, where he gives details, no one has done more towards the elucidation of the economy of the Parasitic Hymenoptera.

The frequency with which the majority of the Pimplinae occur has already been referred to, and this, combined with its comparatively few species has conduced to facilitate their study. The paucity of thoracic sculpture rendered Gravenhorst's general ignorance of it of less moment in this group than in the two preceding and consequently his descriptions are more lucid, especially when used in conjunction with Taschenberg's two papers on the revision of the type specimens in 1863. Holmgren's Monograph of the Swedish species is useful, though he failed in a good many instances, especially in the genus *Glypta*, to correctly interpret the earlier authors; and these, with Brischke's Prussian notes and a few from Austria by Tschek and Giraud, were practically all that the British workers of the 'eighties found available. Since that time, however, we have had Thomson's most valuable but not voluminous criticisms, and various contributions upon the subject from Schmiedeknecht and Kriechbaumer; and our knowledge is decidedly more advanced than it is respecting any of the other sub-families of the Ichneumonidae.

That the *Lissonotides* have any close relationship with the typical *Pimplides* I do not for a moment believe; the *Acaenitides*, as at present grouped, are very heterogeneous; and the *Banchides* are admittedly aberrant, wherever placed; while the *Xoridides*, though related to some extent in their thoracic sculpture with *Rhyssa*, appear worthy of ranking as a distinct sub-family. As a whole the species herein described may be recog-

nised by the tuberculate or obliquely incised abdomen, though these features fail us in several groups to such an extent that even Gravenhorst described several of the males under the Tryphoninae and no good definition has yet been enunciated by which to distinguish therefrom males of the present sub-family, which have no abdominal modification. The females are readily and at once conclusively known by their sessile abdomen and exerted terebra; the sole exception occurring in the genus *Banchus*, which cannot, however, be separated in general structure far from *Exetastes*, in which the terebra is very distinctly protruded; hence the *Banchides* lead up naturally to the Tryphoninae and, indeed, were therein placed by Thomson.

#### A TABLE OF FAMILIES OF THE ICHNEUMONIDEA (PARASITICA).

(2).	1.	Abdomen emitted from the metanotum..	EVANIIDAE.
(1).	2.	Abdomen emitted from the apex of metathorax.	
(8).	3.	Front wings with discoidal nervures.	
(7).	4.	Terebra rising from near apex of the usually deplanate abdomen.	
(6).	5.	Front wings with two recurrent nervures	ICHNEUMONIDAE.
(5).	6.	Front wings with one recurrent nervure	BRACONIDAE.
(4).	7.	Terebra rising from near base of the usually compressed abdomen ..	CYNIPIDAE.
(3).	8.	Front wings with no discoidal nervures.	
(10).	9.	Prothorax not reaching base of wings; venter emitting terebra .. ..	CHALCIDIDAE.
(9).	10.	Prothorax reaching base of wings; anus emitting terebra .. ..	PROCTOTRYPIDAE.

#### A TABLE OF SUB-FAMILIES OF THE ICHNEUMONIDAE.

(4).	1.	First segment basally contracted; areolet pentagonal.	
(3).	2.	Mesosternum not sulcate; terebra concealed .. ..	ICHNEUMONINAE.
(2).	3.	Mesosternum sulcate; terebra exerted..	CRYPTINAE.
(1).	4.	First segment not petiolate nor areolet pentagonal.	
(8).	5.	Abdomen dorsally deplanate; postpetiole broad.	
(7).	6.	Metanotum rarely longitudinally costate; terebra exerted .. ..	PIMPLINAE.
(6).	7.	Metanotum usually longitudinally costate; terebra concealed. .. ..	TRYPHONINAE.
(5).	8.	Abdomen laterally compressed; postpetiole linear .. ..	OPHIONINAE.

## SUB-FAMILY

# PIMPLINAE.

This, which is the third great division into which the Ichneumonidae is divided by modern authors, may at once be recognised by its sessile abdomen, wherein it differs from both of those with which I have already treated, by the exerted terebra of the females, whereas in the *Tryphoninae* it never extends beyond the anus, and by its deplanate abdomen, which in the last sub-family, the *Ophioninae*, is invariably compressed laterally. No other division possesses the peculiar abdominal sulcatures, incised lines, tubercles and general unevenness of the present group, though these are to a great extent or entirely obsolete in the *Acaenitides* and *Lissonotides*, the males of which bear so close analogy to those of the *Tryphoninae* that I can indicate no line of demarcation: in fact quite recent investigation has revealed the synonymy of several of Gravenhorst's male *Tryphones* with females described by him under the present sub-family. The *Banchides* form a connecting link between these two groups and have also been placed in the *Ophioninae*; they, however, possess facies of their own and their peculiarly large and rhomboidal areolet is unique among the Ichneumonidae.

### A Table of Tribes.

- |      |    |   |               |
|------|----|---|---------------|
| (8). | 1. | Areolet not large and rhomboidal; terebra usually elongate.         |               |
| (7). | 2. | Hypopygium reaching neither the depressed anus nor base of terebra. |               |
| (4). | 3. | Head cubical, not constricted posteriorly; mandibles prominent ..   | XORIDIDES.    |
| (3). | 4. | Head transverse; usually constricted posteriorly; mandibles normal. |               |
| (6). | 5. | Abdomen distinctly impressed or tuberculate, strongly punctate ..   | PIMPLIDES.    |
| (5). | 6. | Abdomen not impressed nor tuberculate, usually finely punctate ..   | LISSONOTIDES. |
| (2). | 7. | Hypopygium reaching compressed anus and base of terebra ..          | ACAENITIDES.  |
| (1). | 8. | Arolet very large and rhomboidal; terebra hardly exerted .. ..      | BANCHIDES.    |

The second and third of these tribes are certainly closely related in their general conformation and structure, but may instantly be distinguished by the stouter and more robust form of the former, which further usually has the abdomen and thorax less cylindrical with conspicuous tubercles or rugosities on the segments. The remaining three tribes are very distinct both *inter se* and from those already mentioned; in fact, so marked is the lack of structural affinity that it is only the common features of the more or less sessile abdomen and exerted terebra that cause them to be grouped together, and so form a more convenient disposition of the Ichneumonidae.

## TRIBE

## XORIDIDES.

*Table of Genera.*

- |       |  |                           |
|-------|--|---------------------------|
| (6).  | 1. Wings with an areolet.  |                           |
| (3).  | 2. Areolet distinctly pentagonal; abdomen petiolate .. .. .                                  | ECHTHRUS, <i>Grav.</i>    |
| (2).  | 3. Areolet triangular; abdomen subsessile.   |                           |
| (5).  | 4. Mandibular teeth unequal; head cubical .. .. .  | POEMENIA, <i>Holmgr.</i>  |
| (4).  | 5. Mandibular teeth equal; head transverse .. .. .   | PHIDIAS, <i>Voll.</i>     |
| (1).  | 6. Wings with no areolet.  |                           |
| (14). | 7. Abdomen subpetiolate; face anteriorly constricted.  |                           |
| (9).  | 8. Abdomen strongly compressed, discally cariniform; metathoracic spiracles circular .. .. . | TROPISTES, <i>Grav.</i>   |
| (8).  | 9. Abdomen deplanate, discally broad; metathoracic spiracles ovate or elongate.              |                           |
| (11). | 10. Hind femora dentate beneath ..   | ODONTOMERUS, <i>Grav.</i> |
| (10). | 11. Hind femora entire beneath.  |                           |
| (13). | 12. Frons distinctly dentate in the centre   | ISCHNOCEROS, <i>Grav.</i> |
| (12). | 13. Frons simple .. .. .   | XORIDES, <i>Latr.</i>     |
| (7).  | 14. Abdomen subsessile; face anteriorly quadrate .. .. .                                     | XYLONOMUS, <i>Grav.</i>   |

This Tribe follows the *Cryptinae* in natural sequence; in fact it is difficult to determine where one begins and the other terminates. Thus the more typical genera (the last four enumerated above) are easily known by their cubical head, curiously reticulate exoskeleton and entire lack of areolet. But in *Echthrus* the areolet is pentagonal and the abdomen petiolate as in *Xylophrurus* (*cf.* *Ichn. Brit.* ii. 326); *Poemenia* might perhaps be placed in closer association with *Ephialtes*; while *Phidias* is an altogether anomalous genus, related to the *Plectiscides*, but relegated to the aberrant *Pimplinae* by its author. Nor are the limits of this Tribe well defined, since some doubt must be entertained respecting *Oedematopsis* and its allied genera, in spite of their elongate hypopygium; their economy, however, is undoubtedly related to the Lepidoptera, while that of the present group would appear confined to the lignivorous Coleoptera, and we must regard the records of Ratzeburg, and probably also Giraud, to the contrary with suspicion. Throughout the whole of the parasitic Hymenoptera it will be noted that the head is as a rule cubical in those species (e.g. *Hecabolus*, *Histeromerus*, *Cheiropachus*, &c.) which prey upon lignivorous hosts.

ECHTHRUS. *Gravenhorst.*

Gr. I.E. iii. (1829), 861.

Head subcubical and rectangular; clypeus short and discreted with an apical lamelliform projection; eyes oval and prominent. Antennae normal or slender filiform, usually white-banded and always with the

apices of the slender flagellar joints subincrassate. Thorax subcylindrical and not short; notauli distinct, mesosternal sulci entire; metathorax rugose with the areae more or less, and the petiolar area, entire; spiracles small and subcircular. Scutellum a little convex, triangular and apically obtuse. Abdomen stout, elongate, subpetiolate and convex, of ♂ nearly parallel-sided, of ♀ shorter and oblong-ovate; basal segment narrower than the following and shallowly canaliculate with the petiole stout and gradually constricted basally; postpetiole longer than broad and in ♀ apically explanate, slightly longer and a little broader than the petiole; abdomen nearly smooth; terebra about as long as the abdomen or body, and emitted from a ventral fold. Legs not short; front tibiae, especially in ♀, inflated and basally sharply constricted; fourth tarsal joint bilobed; claws simple. Wings somewhat ample and usually clouded; nervures strong, areolet large and pentagonal.

Ratzeburg thought this genus hardly distinct from *Xorides*, but Taschenburg calls attention to the similarity of the antennal joints to those of *Cryptus* and of the shape of the thorax with that of *Ephialtes*. Thomson (O. E. viii. 776) says that this genus forms a connecting link between the Cryptinae and the present sub-family, from the remaining genera of which the pentagonal areolet, entire mesopleural sulci and petiolar area, inflated front ♀ tibiae, and bilobed fourth tarsal joint will distinguish it. His *Macrocryptus* (*Xylophrurus*, Först.) was erected for the reception of *E. lancifer*, Grav., which was placed among the Cryptinae (lib. cit. v. 486), on account of its hardly bordered petiole, the spiracles of which are further behind the centre (*cf.* Ichn. Brit. ii. 326).

Only one of our species appears to have been bred, but Ratzeburg records (Ichn. d. Forst. iii. 115) three German species from xylophagous Coleoptera (*cf.* Trans. Ent. Soc. 1907, pp. 18, 21, 30, 47) and another as having been somewhat doubtfully raised from a species of Tortrix.

#### Table of Species.

- |      |  |                       |
|------|--|-----------------------|
| (2). | 1. Second segment roughly shagreened;<br>wings not fasciated | 1. RELUCTATOR, Linn.  |
| (1). | 2. Second segment smooth; wings<br>transversely fasciated    | 2. NUBECULATUS, Grav. |

#### 1. *reluctator*, Linn.

*Ichneumon reluctator*, Linn. F. S. 402. *Cryptus reluctator*, Fab. Piez. 79. *Echthrus reluctator*, Gr. I. E. iii. 863; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 72; Tasch. Zeits. Ges. Nat. 1863, p. 302, ♂ ♀.

A stout and shining black species with the abdomen mainly red. Head dilated behind the eyes; mouth parts infuscate. Antennae slender, filiform and somewhat longer than the body; flagellum of ♂ with joints nine to fourteen, of ♀ with joints five to nine usually, white. Thorax immaculate and alutaceous; mesonotum centrally depressed, with distinct notauli; metanotum rugose throughout, with the areola irregularly subrotund, truncate at base and apex, laterally indistinct and emitting the costulae from its centre; apophyses small and acute. Scutellum black and coarsely punctate. Abdomen of ♂ narrower than thorax, equilateral and apically sub-compressed, that of ♀ as broad as the thorax and oblong-ovate; black with segments two to three or four

entirely red, the fifth and in ♀ apex of the first broadly also red or castaneous; first segment twice longer than apically broad, basally bicarinate and a little dilated towards the apex; postpetiole dilated from the spiracles to its centre and thence parallel-sided; the two basal segments roughly shagreened, and the third obsoletely transaciculate; venter of ♀ plicate; terebra black and about as long as the body with the sheaths not pilose and the spicula castaneous, becoming hardly incrassate before the acuminate apex. Legs elongate, slender and red; coxae, trochanters, hind tarsi and usually their tibiae black, posterior femora and more or less of the intermediate tibiae also sometimes black; front tibiae of ♀ strongly, of ♂ slightly, incrassate and basally constricted. Wings slightly and equally clouded throughout and not centrally darker; ramellus distinct, areolet emitting recurrent nervure from its centre; nervellus intercepted distinctly below the centre. Length, 10-13 mm.

The colouration of the legs is variable. The conformation and sculpture of the two basal segments, the uniformly infumate wings and position of the nervellus will at once distinguish this species.

This is the most widely distributed species of the genus in northern Europe and probably the commonest in Britain, though I have not met with it myself. Piffard has given me the female from Felden in Herts; Adams took it at Lyndhurst in the New Forest towards the end of June, 1902; and Chitty has found it near Faversham. Nothing appears to be at present known respecting its economy.

## 2. *nubeculatus*, Grav.

*Echthrus nubeculatus*, Gr. I. E. iii. 866, ♂ ♀; cf. Bridg. Trans. Ent. Soc. 1887, p. 379.

Head closely and coarsely punctate; cheeks finely and alutaceously punctate; face clothed in short white pilosity with the epistoma and orbits slightly elevated; clypeus and mandibles somewhat large, the lower tooth of the latter a little the longer. Antennae black, of ♂ half longer than the body, of ♀ with the tenth and eleventh joints white. Thorax and scutellum black, the former closely and coarsely punctate; mesonotum shining, as also are the broad and semi-circular external and the triangular basal areae; the remainder of the metathorax coriaceous, with the areola laterally wanting and petiolar area basally entire. Abdomen closely punctate, castaneous with the first segment basally, and in ♀ the anus more or less, infusate; basal segment stout, convex, apically glabrous, laterally shagreened with the feeble central furrow not reaching the apex and the sides margined, its spiracles central; remaining segments smooth with the sides and anus obsoletely pilose; venter in both sexes plicate; terebra hardly longer than abdomen, black with the spicula castaneous and very distinctly incrassate before the acuminate apex. Legs with the coxae and trochanters black; femora castaneous, the anterior from base to near apex beneath, and the hind ones with a basal mark, black; front tibiae rufotestaceous, posterior castaneous; tarsi infusate with the first joint of the front ones basally beneath and their calcaria distinctly arcuate. Wings somewhat clouded with the apex and a discoidal fascia darker; radix and tegulae infusate; nervellus subopposite and intercepted only slightly below the centre. Length, 10 mm.

Gravenhorst says that the size and shape of this species are similar to *Xylophrurus lancifer*, but that the front tibiae of the ♀ are somewhat more slender.

I possess a female with the sixth to ninth flagellar joints pure white above; the two basal and the scape beneath, the facial, vertical and a broad apical mark at the external orbits, the epistoma and clypeus centrally, mandibles except at apex and the palpi, clear red; linear callosities above the front coxae, beneath the front and hind wings and all the coxae more or less beneath, concolorous; the wings hardly infumate with a determinate fascia beneath the stigma, but no apical mark, infusate.

Bridgman introduced this species as British (*loc. cit.*) and says that Mr. G. C. Champion has taken a female at Aviemore. It is evidently widely distributed, though probably rare with us, since the only specimen I have seen was given to me by Mr. Frank Morey, who captured it some years ago in the Isle of Wight; it is, however, as above mentioned, decidedly untypical. Giraud raised it in France from the Longicorn, *Saperda populnea* (Ann. Soc. France, 1877, p. 410; cf. Trans. Ent. Soc. 1907, p. 31).

### POEMENIA, Holmgren.

Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 66; *Phthinoses*, Tschek, Verh. z.-b. Ges. 1868, p. 272; (?) *Calliclisis*, Först. Verh. pr. Rhein, 1868, p. 169.\*

Head hardly buccate, with the face very slightly narrowed towards the mouth; clypeus a little deflexed before the apex and slightly emarginate; the apical mandibular teeth of distinctly unequal length. Antennae filiform and porrect, with the scape externally excised. Thorax cylindrical, with the notauli deeply impressed; metathorax longer than high, with the areae obsolete, its spiracles circular and a little before the centre. Abdomen subpetiolate, linear-cylindrical and smooth with the six, or in ♂ seven, basal segments elongate; basal segment narrow, gradually and but slightly explanate towards its apex, with no carinae nor canaliculations; two apical segments of ♀ longitudinally cleft with the hypopygium small and covering the base of the terebra, which is as long as or a little shorter than the abdomen. Legs slender; the hind ones somewhat long with their coxae elongate; tarsal claws in both sexes simple. Wings not broad, with the areolet triangular and the nervellus emitted from above the centre.

This genus is placed in its present position by Thomson (O. E. viii. 774), who says its conformation is similar to that of *Ephialtes*, though

\* Beyond the diagnosis (head cubical; mandibles prominent and forming with the apex of the almost entirely deflexed clypeus a kind of mouth; face neither square nor protuberant; antennae not short and straight; abdomen petiolate, not laterally compressed nor dorsally aciculate-rugose; second segment not bicarinate; hind legs not both elongate and incrassate at once) of his family *Xoridoidea*, Förster simply indicates his genus by:—Mandibles of unequal length; frons not dentate; front tibiae not incrassate; hind femora not dentate beneath; and the entire and pentagonal areolet. Elliott remarks, *in lit.*, "There are so few characters in common to the descriptions of these two genera that it is difficult to compare them, but I should say that they are not the same on these grounds:—*Phthinoses* has the clypeus hardly deflexed apically, and the areolet triangular; *Calliclisis* has the clypeus deflexed throughout (a family character), and the areolet pentagonal. I note that Förster distinctly says "Arolet five-sided," whereas Ashmead places it in the section with "Arolet in front wings wanting, or small, triangular, or rhomboid, never large or pentagonal." As to the now comparatively unimportant matter of priority, should they be synonymous, Tschek's paper was read on March 4th, 1868; Förster's preface is dated February 18th, 1868; but I am not aware which was first published.

it may at once be known by the untuberculate abdomen, the petiolar membrane not reaching the centre and by its lack of epinemia.

I have been led by a MS. note in the British Museum Collection to the certainly correct determination that our British species, hitherto known under Tschek's genus *Phthinodes*, is synonymous with one of Holmgren's from Sweden, which was described under the present genus. The latter must therefore undoubtedly take precedence, unless it be argued that species both with and without an areolet cannot form a natural group. Ashmead places *Poemenia* under the genera with abdomen distinctly sessile, although it is said by its author to be "sub-petiolum." The former further sinks Tschek's genus as synonymous with *Calliclisis*, Först., the priority of which I consider doubtful and the characters, especially in lack of type, inadequate.

### 1. *hectica*, Grav.

*Ephialtes hecticus*, Gr. I. E. iii. 248, ♂. *Phthinodes hecticus*, Tschek, Verh. z.-b. Ges. 1868, p. 272, ♂ ♀. *Poemenia tipularia*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 67, ♀.

Black, alutaceous and a little shining. Head as broad as the thorax, and hardly constricted behind the eyes; face finely pubescent and narrower than the impressed frons; palpi whitish. Antennae filiform, a little longer than half or in ♂ nearly as long as the body with the four basal joints white beneath, becoming darker apically; basal flagellar joint hardly longer than the second. Thorax slender and cylindrical; margin of the propleurae (and in ♂ the prosternum), a callosity before the radix, and often the lateral sutures of the metathorax, flavescent; mesonotum deplanate and subscabriculous; metathorax gradually declived towards the apex, subgranularly rugose; areae wanting, or at most with a faint indication of a narrow central longitudinal canalication. Abdomen elongate, narrower and thrice longer than the thorax, and gradually contracted towards the base; basal segment sublinear, four times longer than broad and a little longer than the hind coxae; the following very gradually becoming shorter and broader, with the seventh of the ♂, and fifth of ♀, quadrate; terebra eleven-twelfths of the length of the abdomen. Legs slender; the anterior stramineous and, in ♀, posteriorly fulvous; intermediate coxae fulvous with their apices flavidous; hind leg red with their trochanters partly whitish but, like their femora, often more or less infusate above; hind tarsi and tibiae infusate, with the latter often whitish before the base, and their coxae elongate and finely punctate. Wings narrow, iridescent, subhyaline and broader in expanse than length of body; stigma piceous, radix and tegulae white; areolet small, irregularly triangular and subsessile, or in ♂ sometimes petiolate; nervellus oblique and intercepted far above the centre. Length, ♂ 12-13 mm.; ♀ 10-17½ mm.

Tschek indicates two ♀ varieties; one with the prothorax immaculate and the other with the intermediate abdominal segments apically pale-margined.

The ♂ of this species resembles those of *Ephialtes*, in which genus it was originally placed, though the outline of both the body and legs is more slender and the abdomen is basally more attenuate. It is larger than *P. brachyura*, Holmgr., which is not unlikely to occur with us, with the antennae basally and rarely the much longer segments apically white,



the hind coxae are shorter than the basal segment and terebra considerably longer than half the abdomen.

Bignell says (Trans. Devon. Assoc. 1898, p. 506) that he has bred a male of this species in southern Devonshire, on 10th May, from a decayed apple tree, containing fossors and beetles; it was, however, introduced as British by Desvignes in 1856, on the strength of the two male examples in his own collection and now in the British Museum. I have also seen a female captured by Mr. Bowsen on 23rd June at Lee, in S.E. London.

### PHIDIAS, *Vollenhoven*.

Voll. Tijds. v. Entom. 1878, p. 163.

Head subbuccate and transverse, with the occiput distinctly bordered; eyes prominent; mandibular teeth of equal length and apically obtuse; clypeus profoundly discreted and apically deflexed throughout. Antennae subfiliform, somewhat elongate and slightly incrassate towards their apices; scape not cylindrical. Mesonotal notauli distinct and deeply impressed, subfoveolately confluent at the base; metathorax elongate, somewhat declived posteriorly with a distinct and elongate arcola; petiolar area very short and basally entire. Scutellum subconvex. Abdomen subpetiolate with the second to fourth segments explanate and the anus clavate; basal segment linear, parallel-sided, at least thrice longer than broad, with the spiracles before the centre and, like the base of the second, roughly strigose; remainder very closely and finely rugose, with sparse, grey pilosity, becoming more nitidulous apically; thyridii circular and pellucid; terebra shorter than body. Legs somewhat slender and elongate; coxae ovate with the hind ones oblong; femora somewhat stout; calcaria short and of equal length; tarsal claws very small, curved and simple. Wings somewhat narrow and apically rounded; areolet subpetiolate and obliquely triangular; lower wing with the median nervure strongly curved.

"Genre voisin d'*Arenetra* et comme celui-là appartenant aux *Pimplides* aberrants," says von Vollenhoven (*l.c.*); but Thomson, who received it from Bridgman, has placed it in the *Plectiscides* next to *Allomacrus*, Förster, though adding that the form and sculpture of the abdomen closely resemble those of *Oedematopsis*. The obliquely quadrangular areolet is the only feature I can detect to justify Thomson's position, for the distinctly deplanate abdomen, the sculpture of the metathorax and conformation of the clypeus are all very different, the last so closely resembling that of the *Xoridides* as to certainly place this genus in the vicinity of that group. I had at first placed it in the *Acaenitides* but the hypopygium is strongly retracted and does not reach the base of the terebra; and its only disparity from the present group is the distinctly transverse form of its head.

#### 1. *aciculatus*, *Voll.*

*Phidias aciculatus*, Voll. Tijds. v. Entom. 1878, p. 164, pl. x, figg. 2, 2a; Thoms. O.E. xii, 1283, ♀.

Black and dull with segments pale-margined. Head strongly nitidulous, almost broader than the thorax with the vertex strongly narrowed behind the eyes; frons smooth, above the scrobes impressed and glabrous; eyes

large, prominent and brown; face sub-parallel-sided; palpi elongate and whitish; clypeus and mandibles rufescent. Antennae a little longer than two-thirds of the body, nigrescent with the three basal joints dark brown; flagellum consisting of about twenty shortly and very finely pilose joints, of which the first is longer than the second. Thorax obsoletely villose, black, shining and elongate; mesothorax strongly nitidulous; metathorax dull, finely and scabrously punctate, longer than broad and apically constricted; areola linear and the lateral costae obsolete. Scutellum somewhat large and shining. Abdomen dull, elongate and infusate; basal segment slightly curved and, with the base of the apically flavidous second segment, rugosely aciculate; remaining segments apically narrowly flavidous with the ultimate pale throughout; terebra one-third the length of the abdomen, straight, linear and not pilose. Anterior legs clear brown with the coxae and trochanters flavidous; the hind ones darker with the trochanters, apices of the coxae, base of the tibiae, with the base and apex of the femora, dull flavidous; fifth tarsal joint double length of the fourth. Wings not clouded; stigma infusate and emitting the radius, which has both its basal and apical abscissae straight with the latter half as long again as the former, from its centre; lower angle of the discoidal cell rectangular; nervellus a little oblique and antefurcal, intercepted below the centre. Length, 6-8 mm.

The ♂, which has not hitherto been described, differs from the ♀ only in having the face on either side below the antennae and the whole of the prothorax, except a narrow discal vitta, white; the antennae basally beneath, the hind coxae and their femora, paler; the basal segment narrower and the apical tarsal joint hardly longer than the penultimate; and the antennae nearly as long as the body.

This species has never been mentioned in British literature and I have heard of no Continental records. The female was originally described from a specimen sent from England by Rev. T. A. Marshall, in whose Catalogue is a MS. note on this species, placed near *Lampronota*, "Two females and one male taken by me. Another male (very small) by Bignell"—presumably in Devon and Cornwall.

I possess a full series of both sexes in Dr. Capron's collection from Shere in Surrey. It is probably not uncommon in the southern counties, though I have never personally met with it.

### TROPISTES, *Gravenhorst*.

Gr. I. E. iii (1829), 442.

This genus is at once known from all other Pimplinae by the entirely and extremely strongly compressed abdomen, and, among the Xoridides, by its quite circular and very small metathoracic spiracles and obsoletely sculptured abdomen, which is almost petiolate.

It is so rare that discussion respecting its most natural position has been awakened only during comparatively recent years. Gravenhorst in 1829 placed it in the *Banchides*, between his genera *Coleocentrus* and *Arotes*, remarking at the same time upon the relation set up by the compressed abdomen on the one side to *Porizon* and *Cremastus* and by the cubical head on the other to *Xylonomus* and *Xorides*. Thomson in 1884 appears to be the next author who met with this genus, a species of which he described, without recognising its relation to *Tropistes*, under the name

*Hemiteles falcatus* (O.E. x. 999). This is pointed out and Dr. Kriechbaumer's remarks on the present genus with descriptions of new kinds criticized by M. A. Roman, of Upsala, in his two papers, "*Tropistes rufipes*, Kriechb. und die systematische Stellung der Gattung *Tropistes*, Grav." and "Ueber *Tropistes rufipes*, Kriechb. und *Hemiteles falcatus*, Thoms." (Zeits. Hym.-Dip. 1904, p. 214 et 1907, p. 319). He conclusively shows that the former species is synonymous with that of Thomson, which has ten years priority, and yet the former is retained by Schmiedeknecht in his Opusc. Ichn.; M. Roman has kindly sent me Thomson's species, and I entirely concur with his synonymy. Thus we see Thomson places this genus in the *Cryptinae*; its compressed and subpetiolate abdomen refers it to the *Ophioninae*; but I think, with Schmiedeknecht, that its most natural position is in the *Xoridides*.

Probably both the palaearctic species occur with us; I alone have taken one of them.

### 1. nitidipennis, Grav.

*Tropistes nitidipennis*, Gr. I. E. iii, 445; Schm. Opusc. Ichn. 1377, ♀. Varr. *T. fuscipes* et *T. nigriventris*, Kriech. Ent. Nachr. 1894, p. 260, ♀.

Head subglobose; eyes oval and not very prominent; frons strongly convex, smoothly reticulate; vertex very broad, slightly impressed behind the front ocellus; palpi dull stramineous, mandibles centrally ferrugineous. Antennae filiform and slender, a little shorter than the body with the three basal flagellar joints elongate and basally paler, apical ones slightly incrassate with the ultimate obtuse. Thorax gibbulous-cylindrical, four times longer than broad, immaculate; mesonotum much longer than broad, nitidulous and finely pubescent, anteriorly elevated and perpendicular with fine and elongate notauli; metathorax nitidulous and finely reticulate, with the lateral costae complete only at apex; central areae entire, basal narrow and elongate, areola hexagonal and not broader than long with the costulae and apex obsolete, petiolar area subconcave and laterally strongly costate with its base truncate; spiracles small and quite circular. Scutellum not convex, black with the obsoletely punctate disc nearly twice longer than basally broad. Abdomen smooth, subpetiolate, longer and narrower than the thorax, usually centrally badious or rufescent; laterally so strongly compressed as to render the disc cariniform; anus nitidulous and laterally clavate; basal segment smooth and convex, gradually dilated apically, with spiracles between centre and base; second less compressed than remainder, very finely sculptured throughout with the basal thyridii distinct; terebra a little shorter than the abdomen, strongly deflexed, with spicula castaneous and valvulae shortly pilose. Legs normal and not stout, red with coxae black and the anterior apically ferrugineous beneath; hind trochanters often infusate; basal tarsal joint nearly as long as remainder combined; hind calcaria unequal in length, front ones curved with their tibiae not intumescent. Wings hyaline and iridescent; stigma and radius piceous, radix and tegulae stramineous; areolet wanting, nervellus intercepting very slightly below the centre. Length,  $5\frac{1}{2}$ -8 mm.

This species sometimes has the femora and tibiae infusate or the abdomen nearly entirely black; the British specimen is of the latter form.

Very little appears to be known of the distribution of this species, which is perhaps commonest in Germany, but even there very infrequent. Graven-

horst thought his single example came from the vicinity of Hanover. I was, then, surprised to capture a female by "dandling" (i.e. gently swinging backwards and forwards through the air) my net over herbage by the road-side at Lyndhurst, in the New Forest, on 12th August, 1901. It differs very slightly from *T. falcatus*, Thoms., in its smaller size, shorter terebra, black coxae and the conformation of basal segment, which in the latter is subconcave discally. Nothing is yet known of the habits of either species and the genus is without males, which are probably deplanate, like those of the *Stilpnides*.

### ODONTOMERUS, *Gravenhorst*.

Gr. I. E, iii, 851 (1829).

Abdomen claviform, petiolate; areolet wanting; hind femora stout, compressed and dentate; terebra elongate. Head very broad, short, cubical or transversely subglobose, and anteriorly convex; eyes oval and prominent; clypeus short, semi-circular, deplanate, smooth and pubescent, basally discreted and laterally remote from the eyes; mandibles short, basally dilated, apically narrow and shortly bifid, with the upper tooth a little the longer; palpi elongate and pilose with the basal joint truncately clavate, the second compressed and the apical three cylindrical, with the apical obtuse and about as long as the penultimate. Antennae slender and filiform-setaceous, of ♀ submoniliform; scape cylindrical with the apex straight and hardly excavate; flagellar joints discreted, cylindrical and apically nodulose, the basal ones the longest and a little constricted basally. Thorax cylindrical and deplanate, with distinct mesonotal notauli; metathorax rugose in ♂, smoother in ♀; metanotal areae distinct; spiracles large, oval and oblique. Scutellum deplanate and triangular with the apex obtuse. Abdomen subpetiolate, convex, smooth, pyriform and as broad as thorax; basal segment with the petiole linear and as long as the postpetiole, which is a little broader and gradually explanate apically. Terebra exerted, usually rather longer than the abdomen. Legs short; hind femora stout, sub-compressed and beneath dentate; tarsal claws small and simple. Wings somewhat narrow with no trace of areolet.

Thomson remarks (O.E. viii, 776) that the conformation of the thorax and wings is exactly as in *Xylonomus*, although the short stout and apically attenuate antennae, basally inflexed genal costa, somewhat broad abdominal epipleurae, long and stout claws, and the strongly dentate hind femora render it abundantly distinct. Gravenhorst draws attention to the relationship of this genus with his *Pachymerus* (*Collyria*).

We possess, as far as is at present known, but one of the four European species (or if the modern fallacy of regarding seven distinct species be continued we may, perhaps, claim three of these "forms") and that would appear to be of very rare occurrence with us, and is now, for the first time proved to prey upon uncommon lignivorous larvae.

#### 1. *dentipes*, Gmel.

*Ichneumon dentipes*, Gmel. S.N. i, 2719, ♂. *I. ruspator*, Fourc. E.P. ii, 397 (nec Linn.). *Xorides dentipes*, Gr. Beit. Ent. Schl., 1829, p. 15, fig. ii; Ratz. Ichn. d. Forst, ii, 107, ♂ ♀; cf. iii, 115. *Odontomerus dentipes*, Gr. I.E. iii, 854; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 73; Tasch. Zeits. Ges. Nat. 1863, p. 304, ♂ ♀. *O. punctulatus*, Thoms. O.E. viii, 777, ♀; Kriech. Ent. Nachr. 1889, p. 76; Schm. Opusc. Ichn. 1376, ♂ ♀.

A black, punctate and shining species. Head with the palpi pale or infusate; labrum sometimes red or dull ferrugineous. Antennae longer than half the body, subsetaceous, black. Thorax immaculate; mesonotum punctate; metathoracic apophyses distinct and subacute. Abdomen as broad as and a little longer than the head and thorax, black or nigrescent, rarely piceous and usually with the central segments sub-badious; basal segment straight, one third the length of the abdomen, generally apically paler, of ♂ long, linear and aciculate, of ♀ shorter and strongly dilated apically, smooth or scabrous with the spiracles before its centre; terebra emitted before anus and as long as the body, black with spicula red. Legs normal, red; femora somewhat compressed, the hind ones stouter and elongate-oval with a strong and apically subreflexed tooth beneath, between which and the base they are finely ciliate and sometimes infusate; coxae and trochanters nigrescent with the apices of the latter red; intermediate tibiae of ♀ curved before the apex; hind tarsi often infusate. Wings somewhat clouded with stigma infusate or piceous, radix and tegulae stramineous, the former sometimes ferrugineous and the latter often black. Length, 5-14 mm.

Each host, probably, has a slightly different form of this parasite.

Thomson (O.E. viii, 777) has broken this species up into three, *O. Pictorum*, *melanarius* and *punctulatus*, founded mainly on the varying length of the terebra. I am, however, convinced that these are but forms of one, since specimens bred together show very distinct variability in this respect. Gravenhorst's very full description and initial diagnosis distinctly show that it is the last of these "forms" which he describes.

The widely distributed Continental *O. appendiculatus*, Grav., differs in the narrower basal segment which is apically appendiculate on either side, the laterally more strongly punctate head and the much longer terebra. Following the above useless method of comminuting this present species into several, *O. appendiculatus* and Thomson's new *O. quercinus* (which differs from it in having the terebra only as long as the body), are the only species with the intermediate tibiae simple. In early June, 1907, Mr. Keys was so good as to send me many *O. dentipes* bred by him from *Rhopalomesites tardyi* at Plymouth; these have the tibiae simple and terebra as long as the body, but every other character of that species is utterly lacking, conclusively showing them to be inconstant.

This is by no means an uncommon species on the Continent, where Ratzeburg thought it might possibly be parasitic upon *Bombyx monacha*; Dours (Cat. 72) probably erroneously adds *Osmia aurulenta* and *O. bicolor*; but Gravenhorst, who also found it in August, once noticed a female flying about a stack of wood at Breslau, in June, and its relationship to lignivorous Coleoptera is strongly presumptive from a MS. note in Marshall's copy of his 1872 Catalogue: "♂ taken by Bignell, Aug. 6th, entering burrows of *Mesites tardii*" (cf. Trans. Ent. Soc., 1907, p. 57). This is the only mention I can find of its occurrence in Britain, where it was first introduced in 1870. In May, 1907, Donisthorpe discovered in London, a live ♂ in a drawer of his insect-cabinet, where were specimens of the above weevil recently taken near Plymouth; on hearing of this, I requested Keys to procure specimens from that locality, which he did, the largest measuring only 6 mm. So small a host naturally causes a relatively small parasite; whereas a female taken at Newtownmore, by Donisthorpe, in 1907, is nearly 12 mm. in length, of the form *pictorum* in pedal colour and *punctulatus* in terebral length.

**ISCHNOCERUS**, *Gravenhorst*.

Gr. I.E. ii (1829), 949; *Mitroboris*, Holmgr. Sv. Ak. Handl., 1860, n. 10, p. 72.

Head stout and broad but transverse, subbuccate and not narrower posteriorly than the oval eyes; frons with a central bifid, broad and centrally canaliculate horn above the scrobes; vertex broad, occiput bordered; epistoma subconvex and laterally obliquely canaliculate; clypeus discreted and deplanate, transverse and basally glabrous, with a row of stout bristles at base and apex; genal sulcus distinct, cheeks elongate; maxillary palpi very long, apically slender, with the two apical joints subequal in length. Antennae very slender, filiform, a little longer than the head and thorax, and obsoletely pilose throughout. Thorax cylindrical and coarsely punctate; mesonotum centrally depressed and dull, longitudinally punctate; notauli very distinct, sternauli wanting; metathorax apically obtusely produced laterally; metanotal areae sharply costate, apophyses very large and stout; spiracles oval, oblique. Scutellum triangular, deplanate and apically obtuse. Abdomen subpetiolate, oblong, shining, convex, longer and about as broad as the thorax, of ♂ narrower; basal segment bicarinate and margined throughout, with the postpetiole gradually dilated; segments two to six transaculate and apically glabrous; the fourth ventral acutely prominent; eighth of ♀ exerted and conical; terebra half length of body. Legs normal, femora somewhat stout, claws curved and not pectinate. Wings a little narrow, areolet wanting, fenestrae very broadly discreted.

This genus is placed by Gravenhorst among the *Cryptinae*. Its name appears to be founded upon the metathoracic apophyses and not upon the frontal horn, which Gravenhorst entirely overlooked. Consequently we find our British species placed under *Xorides* by Ratzeburg and a new genus by Holmgren; and it was not till 1880 that the true synonymy was established by Brischke. This was at once accepted, in MS., by Marshall and the specimens in the British Museum show that Desvignes also recognised Gravenhorst's genus.

**1. rusticus**, *Fourc.*

*Ichneumon rusticus*, Fourc. E.P. ii. 426. *Ischnoceros rusticus*, Gr. I.E. ii. 951; Tasch. Zeits. Ges. Nat. 1865, p. 139, ♂ ♀; Voll. Schets. I. pl. i, fig. 23; Brisch. Schr. Nat. Ges. Danz. 1880, p. 129. *I. seticornis* et *I. filicornis*, Kriech. Corres. Zool. min. Ver. Reg., 1879, pp. 164-5, ♂ ♀. *Xorides cornutus*, Ratz. Ichn. d. Forst. ii, 108, ♀. *Mitroboris cornuta*, Holmgr. Sv. Ak. Handl., 1860, n. 10, p. 72, ♂ ♀; cf. Thoms, O.E. viii, 776.

Strongly punctate, a little nitidulous and black, with the legs nearly entirely bright red. Head with the clypeus semicircularly discreted, apically subtruncate and coarsely punctate, cheeks strongly and sparsely punctate; mandibles narrow, subdilated basally, externally subaciculate, convex and obtusely bidentate at the apex with the upper tooth a little the longer; frons and vertex convex and broad, the latter much higher than the ocelli. Antennae 35-jointed, slender subfiliform, black or nigrescent with the flagellum ferrugineous beneath; scape and flagellar joints elongate, the latter a little nodulose apically. Thorax stout and cylindrical; mesonotum coarsely and, in the centre, sublongitudinally punctate; metathorax strongly and evenly punctate, with four stout, erect and apically obtuse

spines, of which the upper are the longer and are subreflexed at their extremity; areola subcordiform, apically truncate and not discreted from the triangular basal area, costulae emitted from slightly before its centre and, like the lateral costae, strong; petiolar area vertical and the supra-coxal costae apically distinct. Scutellum strongly and evenly punctate, with the interstices nitidulous and glabrous. Abdomen somewhat longer, and in ♂ narrower, than the thorax; of ♂ fusiform, of ♀ oblong-ovate with the fifth and sixth ventral segments prominent; basal segment apically explanate and irregularly aciculate longitudinally; terebra as long as or a little shorter than the abdomen. Legs normal, red; hind tarsi and usually their tibiae black, the latter always with a dull stramineous basal band; apical joint of the anterior tarsi conspicuously black. Wings slightly clouded; stigma nigrescent, radix ferrugineous or testaceous, tegulae piceous; nervellus intercepted in the centre. Length,  $7\frac{1}{2}$ – $12\frac{1}{2}$  mm.\*

That both Kriechbaumer's names cannot stand is obvious, since even if the descriptions of Fourcroy and Gravenhorst be insufficient to reveal to which they belong, Taschenburg's exact measurements supply the deficiency, at all events in the latter case. As to myself, I consider them but small and unimportant varieties of a single species, differing slightly in the shape and puncturation of the head and of the frontal process; I fail to trace any distinction in the conformation of the antennae; and consider the differences of even less consequence than those of the "species" in the last genus. Both forms occur with nearly equal frequency in Britain.

It is found on the Continent from June to August. Ratzeburg (*l.c.*) first discovered its economy; he says that Kielmann took three females at Haasensfelde as they were crawling in and out of the borings of the Longicorn beetle, *Saperda carcharias*, in aspen stems where they doubtless pierce the larvae within the trunk of the tree. Giraud next bred it (Ann. Soc. Fr. 1877, p. 410) out of *Odynerus leavipes*, in Verbascum. Brischke bred it in Prussia from the larvae of *Aromia moschata* and *Rhagium mordax* (*l.c.*); and Tosquinet adds that Dr. Fromont has raised it from *Liopus nebulosus*, in Belgium. There are no records of its having been bred in Britain, though that it is not uncommon is evidenced by the

\* When I first saw this species, I thus described it:—Head with large, strong and not very close punctures throughout, becoming rugose on the face and obsolete on the clypeus, with obsolete sericeous pilosity on the face and cheeks; the ocelli approximate; a little above the antennae in the centre of the forehead is a distinct horn, much scooped out in the centre, and the centre of the face is also raised; face distinctly separated from the clypeus, which is extremely obsolete transaculate and apically truncate; mentum ferrugineous, mandibles black and apically bifid; labium fulvous, ligula flavous; labial palpi piceous with the second joint incrassate, third broadly triangular and the fourth long and subcylindrical. Antennae ferrugineous-piceous, darker at base and apex, joints sub-cylindrical, the basal subnodulose apically, the apical elongate cylindrical. Thorax closely, strongly and confluent punctured; prothorax narrow, truncate in front; mesothorax trilobed, anteriorly and before the wings; disc depressed; much narrowed anteriorly, suddenly explanate below the wings; metathorax evenly punctured with the areae complete and sharply defined, the superomedial pentagonal, transverse ridge not especially strong and terminated laterally in a very long and acute tooth, of which there is another rather smaller on either side the abdominal insertion; spiracles of moderate size, obliquely ovate. Scutellum flat, quadrate-triangular, strongly and thickly punctured, subnude. Abdomen elongate-ovate, thickly and obsolete transaculate throughout, more finely apically; first segment very distinctly petiolate, punctate-aciculate, with two rather feeble carinae and a little depressed at apex, which is gradually explanate; second segment finely transaculate in ♀, much more coarsely and somewhat punctate in ♂; eighth segment very distinctly exerted in both sexes—in ♂ as long as the fifth, in ♀ conical, and as long as the first and somewhat compressed towards its apex. Terebra, exerted level with the dorsal base of the eighth segment, about two-thirds the length of the abdomen, spicula ferrugineous, valvulae black. Legs rufous, apical joint of the front pairs of tarsi, posterior tibiae except at extreme base and tarsi, piceous; femora slightly incrassate. Wings slightly fumato-hyaline and narrow; stigma large and, with the nervures, piceous; costa fuscous, basally ferrugineous; areolet wanting; exterior discoidal recurrent nervure twice interstitial; posterior discoidal recurrent forming an acute angle with the probrachial. Length, ♂ 11 mm; ♀ 13 mm.

number of localities given for it: captured at Horrbridge, in Devon, early in August (Bignell); Lastingham (Yorks. Nat. 1877, p. 39) and probably Huddersfield (*lib. cit.* 1878, p. 70); South Kerry (Irish Nat. 1903, p. 68); Fairlight in Sussex, May, 1889 (Vict. Hist.); I have seen a male taken by Hocking at Copdock, near Ipswich, in 1902; a female by Routledge, about Carlisle, in 1901; and two females by Day at Orton, in the same district, in the middle of March and of May, 1900. Of these latter, Mr. Day writes on the 2nd May, 1900, "They were bred from rotten fir logs in which *Rhagium bifasciatum* was feeding and are undoubtedly parasitic upon that Longicorn. I have just bred another pair from cocoons, which are their own and not those of the beetle; they were taken on 18th March last. I fancy they are not uncommon here, as I have during the last few years repeatedly noticed similar cocoons in the *Rhagium* burrows"; one of the examples sent me by Mr. Day has the wings only partly developed, as though, unlike the majority of Ichneumonidae, these members became mature only shortly before emergence. Thornley took it at Theddlethorpe in Lincs. in 1896 (in coll. Marshall) and I also possess females taken by Adams and Miss Chawner at Lyndhurst, towards the end of May; at Ardross in Ross by Perrins; three females by Bedwell, in the New Forest, during the last half of June, 1904; and both sexes from Shere, in Dr. Capron's collection.

### XORIDES, *Latrielle*.\*

Latr. Gen. Crust. et Ins. iv, 4 (1809).

Abdomen subpetiolate, smooth and shining; areolet wanting; legs slender; face apically contracted. Head transversely subglobose, short, buccate, tumidous, dilated behind the oval eyes and usually rugulose before the postocular orbits; face strongly narrowed towards the mouth; mandibles of normal breadth, with the apical teeth subequal in length; clypeus strongly depressed apically. Antennae slender, filiform and shorter than the body, with the scape externally excised at apex. Thorax cylindrical, nearly twice longer than high; notauli very distinct, mesosternum elongate, epicnemial wanting; metathorax with the upper areae incomplete or obsolete; spiracles small, rotund-ovate and situated a little before the centre. Scutellum convex or gibbulous, and apically obtusely truncate. Abdomen subpetiolate or subsessile, oblong-fusiform, convex, smooth, shining and longer but hardly narrower than the thorax; basal segment twice longer than broad, obsoletely canaliculate and gradually explanate towards the apex, with spiracles before the centre; eighth segment of ♀ exserted; fifth ventral segment prominent, apical of ♀ strongly retracted; terebra about as long as the abdomen. Legs slender, femora sparsely pubescent, tarsal claws simple, tibiae slender or a little incrassate, the front ones denticulate above, hind legs elongate. Wings

\*The genus *Clepticus*, Hal. (characterised:—"Abdomen petiolatum, segmenti II tuberculis mediis s. anticis. Thorax gibbulus. Oculi magni protuberantes. Clypeus basi impressus semicircularis. Antennae pedesque graciles. Areola nulla; radius cum cubito medio connivens. Terebra exerta."—Ann. Nat. Hist. 1839, p. 116) was placed by Marshall (Cat. 1872, 95) and Ashmead (Proc. U.S. Museum, 1900, p. 61) in the *Xoridini*. In Marshall's private copy of his Catalogue, however, I find a MS. note:—" *Clepticus* should go near *Plectiscus*, p. 62—*C. praetor*, Hal. equals *Aniseres pallipes*, Fst. M (Verh. pr. Rheinfl. 1871, p. 93) or *Proclitus grandis*, Fst. (*lib. cit.* p. 118)". It will at once be seen from the generic characters above that it cannot be placed in *Xoridulines*, as was done by Curtis in his "Guide"; and it must be treated of under the Ophioninae. The types are probably extant, though unlabelled, in the Dublin Museum. That Marshall possessed specimens of this genus and Bridgman did not, is stated by the latter (*in lit.* 10th Nov. 1890, in my possession) to the former.



normal, a little narrow; areolet wanting; nervellus intercepted far above the centre.

The shining body, less globose head with contracted face, much more slender and not basally constricted tibiae will distinguish this genus from *Xylonomus*. Gravenhorst refers to its relationship with *Rhyssa*.

*Table of Species.*

- |      |    |   |                       |
|------|----|---|-----------------------|
| (4). | 1. | Postocular orbits not rugose; scutellum black.        |                       |
| (3). | 2. | Flagellum pale-banded; terebra half length of abdomen | 1. ALBITARSUS, Grav.  |
| (2). | 3. | Flagellum immaculate; terebra as long as abdomen      | 2. NITENS, Grav.      |
| (1). | 4. | Postocular orbits rugose; scutellum partly flavous    | 3. SCUTELLARIS, Desv. |

1. *albitarsus*, Grav.

*Xorides albitarsus*, Gr. I.E. iii, 849; Brisch. Schr. Ges. Nat. Danz., 1880, p. 127, ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 66 ♂; Tasch. Zeits. Nat. Ges. 1863, p. 301, ♂ ♀.

An alutaceously punctate and profusely white-marked species. Head not rugulose behind the eyes; palpi, ♂ face and frontal orbits, ♀ facial orbits narrowly, white. Antennae longer than half the body, filiform with the scape and the four basal flagellar joints stramineous beneath, though becoming darker apically; the tenth to fourteenth beneath, and eleventh to thirteenth entirely, dull white in both sexes. Thorax cylindrical; ♂ with the pronotum and callosities beneath the radix white. Abdomen longer than the head and thorax and as broad as the latter, with the five basal segments gradually becoming broader and shorter; the first thrice longer than broad, finely punctate and subcanaliculate; second to fifth obsoletely punctate, remainder nitidulous; fourth to sixth with the apical margin narrowly whitish, and the sixth ventral subproduced; ♂ also with the three basal incisures broadly white; terebra hardly longer than half the abdomen, black with spicula red. Legs with the front trochanters, femora and anterior tibiae mainly stramineous; intermediate femora apically concolorous; apex of the hind trochanters and their tibiae infusate, the latter dull white before the base and their tarsi infusate with joints two to four and apex of the basal white. Wings of ♀ somewhat clouded; stigma of ♂ testaceous, of ♀ black; radix and tegulae pale stramineous or white. Length, 10-13 mm.

This species is of the size and outline of *X. nitens*, but the basal segment is a little longer and it is rendered very distinct by the white markings.

No one appears to have noticed this species in Britain since its introduction by Desvignes, in 1856, on the strength of unlocalised specimens in the National Collection. It is less widely distributed on the Continent than *X. nitens*; and Tosquinet tells us Dr. Fromont has bred it from the Longicorn, *Prionus coriarius*, in Belgium.

2. *nitens*, Grav.

*Xorides nitens*, Gr. I.E. iii, 847; Latr. Cuv. R.A. ed. Masson, pl. cx. fig. 7; Tasch. Zeits. Ges. Nat. 1863, p. 302; Thoms. O.E. viii, 774, ♂ ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 65, ♀.

A black species with only the head and abdomen white-marked. Head with the internal orbits and palpi white, latter in ♀ piceous. Antennae slender, immaculate, subfiliform and a little longer than half the body. Thorax cylindrical; metanotum centrally excavate, with the sides of the impression obliquely striate and the centre deeply and coarsely punctate. Abdomen longer, in ♂ nearly twice, than head and thorax and narrower than the latter; of ♂ slender, strongly nitidulous and parallel-sided, of ♀ elongate-fusiform; basal segment a little dilated apically, twice or in ♂ quite thrice longer than broad; of ♂ smooth and obsoletely canaliculate, of ♀ finely punctate; remaining segments of ♀ alutaceous with at least the apical incisures membranaceously dull white, and the sixth ventral protuberant; ♂ with the eighth segment much shorter than the preceding, bearing two very short styles exerted from apex and, below them, two broader and rather longer valvulae which are internally concave and externally convex; terebra hardly shorter than the abdomen, black with the spicula castaneous. Legs slender, elongate, fulvidous; front coxae usually basally or entirely nigrescent; hind trochanters in part, tibiae, tarsi, often apex and sometimes sides of femora, infusate; calcaria curved. Wings subhyaline with the stigma piceous, radix and tegulae stramineous or whitish. Length, 12-20 mm.

Very little appears to be known of this species, which is probably, like its congeners, parasitic on xylophagous *Coleoptera*, since Gravenhorst took many from June to October at piled wood about Breslau. It has long stood in the British list, but I can find no particular records of capture nor locality; it is said to be represented in the British Museum collection.

### 3. *scutellaris*, Desv.

*Xorides scutellaris*, Desv. Cat. 113, ♂ ♀. X. Wahlbergi, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 65, ♂; Brisch. Schr. Nat. Ges. Danz. 1880, p. 127, ♂ ♀; cf. Thoms. O.E. viii, 774.

Head with the postocular orbits rugulose and broader than the eyes; vertex shining, flat, irregularly and sparsely punctate; occiput bordered; frontal orbits, in ♂ whole of face, and in ♀ generally the facial orbits, white; palpi of ♂ pale and of ♀ ferrugineous. Antennae slender, subfiliform and half length of the body; scape of ♂ pale beneath. Thorax cylindrical, black; of ♂ with the propleurae linearly flavous and often lateral marks on the mesosternum badius; metathorax scabrous, with long white lateral hairs; areae entirely obsolete, a central basal carina and apical costulae traceable; petiolar area well defined, semicircular, glabrous and nitidulous, with a central longitudinal carina; spiracles circular and apophyses wanting. Scutellum and postscutellum in both sexes apically or entirely flavous. Abdomen of ♂ parallel-sided, of ♀ strongly punctate with hoary lateral pubescence; basal segment centrally canaliculate, of ♂ four times and of ♀ twice longer than broad; remaining segments of ♂ of equal length and about half that of the first, third to seventh obscurely whitish at the incisures; ♀ with the third quadrate, fourth to sixth transverse and the seventh gradually sloping to the apex; fifth ventral segment slightly prominent; terebra stout and slightly longer than the abdomen, black with the spicula castaneous. Legs elongate, fulvidous; hind tibiae, tarsi, upper side of trochanters and apices of femora nigrescent or black, the latter with white pubescence; anterior legs of ♂ pale croceous with the coxae and trochanters flavidous; claws of ♀ short,

slender, curved and distinctly bifid before their apices. Wings with the costa and stigma infusate, ♂ with the latter centrally paler; radix and tegulae of ♂ pale, of ♀ ferrugineous. Length, 12-18 mm.

Holmgren's species agrees so exactly with that of Desvignes that no doubt can exist as to the synonymy of these names. The extent of orbital white in the female appears to be variable, as also is the flavescence of the scutellum.

Both sexes were described by Desvignes, in 1856, from specimens in both the British Museum and his own collections; it does not appear to have been noticed in Britain since that time, though recorded from Sweden and Prussia. I possess a single female, whose metathorax is described above, taken recently by Mr. Albert Piffard, at Felden, near Boxmoor, in Hertfordshire.

### XYLONOMUS, *Gravenhorst*.

Gr. I.E. iii, 819 (1829).

Abdomen subsessile, deplanate and basally scabrous; areolet wanting; legs and terebra normal. Head short, subtransverse or subglobose with the face quadrate and not narrowed towards the mouth; clypeus very short, subcircular, basally discreted, often strongly depressed and remote from the orbiculate-oval and somewhat small eyes; genal costa inflexed towards the base of the peristomium; mandibles small, straight, subconical and triangular, apically subentire; palpi elongate, setaceous and pubescent with the basal joint obconical and truncate, the second broader, cultriform and internally produced, the apical more slender and longer than the penultimate. Antennae slender, usually white-banded and sometimes setiferous, stouter in ♀; scape and pedicellus of equal length and subglobose, the latter exerted and a little the narrower; annellus smooth and subobsolete; flagellar joints cylindrical, gradually decreasing in length and apically hardly nodulose. Thorax cylindrical, much longer than high; notauli distinct and elongate; epomia and epicnemial distinct; metanotal areae and apophyses well defined; spiracles linear or oblong. Scutellum more or less convex, triangular and apically obtuse. Abdomen subsessile, somewhat deplanate discally, finely punctate and rarely shining; of ♂ elongate, sublinear or a little dilated towards the apex, narrower and usually twice longer than the thorax; of ♀ shorter and as broad as the thorax, oblong or oblong-ovate. Basal segment longer than broad, scabriculous with usually distinct longitudinal carinae, parallel-sided or in ♀ apically dilated, sometimes laterally impressed with the spiracles slightly behind the centre; eighth ♀ segment exerted. Terebra emitted before apex, not or only slightly longer than the abdomen. Legs normal or subelongate; anterior tibiae, especially in ♀, incrassate and coarctately constricted at the base; tarsal claws small and simple. Wings somewhat narrow; areolet entirely wanting; lower wings with the radial abscissa shorter than the recurrent nerve.

This genus differs from both *Xorides* and *Odontomerus* in the rugulose petiole and broader basal segment, from the former in its quadrate face and the latter in the conformation of its hind femora; its relationship with *Banchus* and *Arotes* is remarked by Gravenhorst.

As its name implies, the species of this genus infest lignivorous larvae; none, however, appear of frequent occurrence with us or upon the Continent.

*Table of Species.*

- |      |    |   |                               |
|------|----|---|-------------------------------|
| (8). | 1. | Basal segment much longer than apically broad.            |                               |
| (3). | 2. | All the tibiae basally, and scutellum apically, white     | 1. PRECATORIUS, <i>Fab</i>    |
| (2). | 3. | Tibiae and scutellum not white-marked.                    |                               |
| (5). | 4. | Radial nervure elongately coalesced with external cubital | 2. RUSTICUS, <i>Desv.</i>     |
| (4). | 5. | Radial nervure but normally coalesced with cubital.       |                               |
| (7). | 6. | Scutellum not laterally reflexed; tibiae not tortuous     | 3. IRRIGATOR, <i>Fab.</i>     |
| (6). | 7. | Scutellum laterally reflexed at apex; tibiae tortuous     | 4. PILICORNIS, <i>Grav.</i>   |
| (1). | 8. | Basal segment not or hardly longer than apically broad    | 5. SECURICORNIS, <i>Holm.</i> |

1. *precatorius*, *Fab.*

*Ichneumon praecatorius*, *Fab.* E. S. ii. 139, ♀. *Cryptus praecatorius*, *Fab.* *Piez.* 72. *Xorides praecatorius*, *Lam.* *His. nat.* iv. 135\*, ♀. *Xylonomus praecatorius*, *Gr. I. E.* iii. 841, ♀; *Ratz. Ichn. d. Forst.* 123; *cf.* iii. 115; *Holmgr. Sv. Ak. Handl.* 1860, n. 10, p. 70; *Tasch. Zeits. Ges. Nat.* 1863, p. 300; *Brisch. Schr. Nat. Ges. Danz.* 1880, p. 128; *Thoms. O. E.* viii. 775 ♂ ♀. *X. parvulus*, *Gr. I. E.* iii. 825, ♂.

A black and white species, subrugosely punctate and hardly shining. Head black with the palpi pale; labrum and the internal orbits white; ♀ with a facial mark, an abbreviated longitudinal line between the antennae and generally part of the external orbits white, often also with a lateral occipital mark red or castaneous. Antennae of ♂ slender, filiform, setiferous and shorter than the body; of ♀ with the scape beneath and a central flagellar band on joints 10 to 15 white. Thorax black, of ♂ cylindrical; of ♀ with two prothoracic dots and the propleurae, callosity beneath the radix, a lateral or pectoral dot, apex of the mesopleurae linearly and a dot above the hind coxae, usually more or less white; pleurae sometimes badious; metathorax with apophyses obsolete and five notal areae complete and distinct. Scutellum with two apical white dots. Abdomen of ♂ immaculate, parallel-sided, a little narrower and longer than the thorax; of ♀ with the basal segment bicarinate throughout, distinctly coarctate behind the spiracles and sometimes apically white-margined; the following laterally and usually also apically white-margined, the last red below; second and third segments transverse and scabriculous, in ♂ with a smooth impression on either side before the base; terebra rather longer than half the abdomen, black with the spicula red. Legs red; anterior coxae and trochanters of ♀ paler or flavous-marked, of ♂ partly black; trochanters usually at least apically nigrescent; hind coxae and trochanters of ♂, and their femora in both sexes apically, black; tibiae basally white, centrally and the hind ones apically infuscate, the anterior in ♀ internally obliquely impressed and tortuous towards the base. Wings hyaline with the stigma infuscate and, in ♀, basally white; radix, tegulae and base of costa stramineous; tegulae of ♂ black, of ♀ white-dotted. Length, 7-11 mm.

\* "Histoire naturelle des animaux sans vertèbres," &c. Par M. le Chevalier de Lamarck. Paris, 1817. 8vo.

The ♀, like all profusely marked Ichneumonidae, varies somewhat in coloration; Gravenhorst instances two varieties, the first with the head and thorax and abdomen variegated with red and white, and the second with face and scutellum entirely white.

This species, the female of which is of the size and outline of *X. irrigator*, differs from *X. pilicornis* in its variegated head and thorax, and basally white tibiae, the ♂ in its shorter and more densely pilose antennae, and immaculate abdomen.

This distinct species, which is very rare in Sweden and not recorded from Belgium, was first described by Fabricius from specimens, taken at Halle in Prussian Saxony, in Hübner's collection. Gravenhorst took several females at piled timber in Germany; and Ratzeburg tells us that he found it several times preying upon *Callidium sanguineum* in hornbeam logs, as well as perhaps *Tetropium luridum*; Thomson says it has been bred from a species of *Callidium* at Lund; and Brischke raised it from *Callidium variabile*. Though all these Longicorn beetles are British, none of them are at all common with us and it is consequently not surprising that there are no records of indigenous breeding; Desvignes introduced this parasite as British on the strength of both sexes in his own collection, in 1856, but the only other notice of it I can find is my own mention (E. M. M. 1903, p. 29) of two females, taken together in a garden in Lyndhurst, in the New Forest, where *Callidium violaceum* is often abundant, on 20th August, 1901. They were flying in the morning, beneath glass affixed to a brick wall for the preservation of fruit trees; and in these instances the antennae have the apical four joints subclavate and distinctly setiferous, with the basal metathoracic area reduced to a single broad carina.

## 2. *rusticus*, Desv.

*Xylonomus rusticus*, Desv. Cat. 122, ♀.

Head black; clypeus with short rufescent pilosity. Antennae half length of the body and apically reflexed. Thorax cylindrical, black; metathorax punctate, unequally bidentate on either side, with the areae hexagonal. Abdomen sub-cylindrical and immaculate with the three basal segments punctate; the first longer than the second and third combined, with a transverse impression before its apex; second and third a little broader, former with gastrocaeli distinct and a small fovea on either side behind the centre; fourth and seventh of equal length, fifth and sixth shorter; third to fifth ventral segments plicate; terebra as long as the body, "inserted in the fifth, colour red; the ovipositors in the terminal abdominal segments; the apexes of the whole a little dilated, but ending in a sharp point." Anterior legs testaceous with the coxae and apical tarsal joint darker, femora basally slender and compressed and apically distinctly dilated, their tibiae internally obliquely impressed, apically intumescent, constricted and tortuous towards the base; hind legs black and simple with the coxae elongate and castaneous beneath, trochanters very short. Wings infumate-hyaline and basally testaceous; tegulae, stigma and costa infusate.

An examination of Desvignes' two ♀♀ in the National collection enables me to add:—Head cubical, hardly broader than long and laterally parallel behind the eyes; vertex glabrous and very strongly nitidulous with a very few scattered punctures; frons distinctly, evenly and not

sparsely punctate, and not longitudinally canaliculate nor eyes emarginate; face closely and somewhat strigosely granulate. Antennae slender, sub-attenuate basally and nearly as long as the body; their underside distinctly setiferous before the hardly attenuate apices. Thorax immaculate; mesonotum strongly deplanate and distinctly punctate with the notauli deep; metanotum transstrigose and centrally carinate from the apex of the triangular basal area to the base of the explanate and laterally strongly bidentate petiolar area. Scutellum black and punctate. Abdomen not broader than the thorax and closely scabriculous throughout; basal segment slightly and gradually dilated throughout, fully thrice longer than broad, basally bicarinate to its centre, with the spiracles a little before the centre; second and third segments distinctly and obliquely impressed in their basal angles; terebra exactly as long as the body, spicula apically dilated and dart-shaped. Legs red with the hind ones castaneous; front femora apically incrassate, their tibiae incrassate and internally excised before the strongly constricted and pseudo-jointed base, apical tarsal joint black; tarsal claws small, calcaria short and of equal length. Wings fulvescent and not broad; stigma and radix testaceous; areolet wanting and the straight radial nervure coalesced with the external cubital for some distance; second recurrent strongly curved; nervellus sub-opposite and intercepting in the centre. Length, 15 mm.

This species was described in 1856 from females in Desvignes' collection captured at Bewdley, in Worcester; and no one appears to have recognised it since that time.

### 3. *irrigator*, Fab.

*Ichneumon irrigator*, Fab. E. S. ii 152 (*nec* Panz.). *Bassus irrigator*, Fab. Piez. 97. *Xylonomus irrigator*, Gr. I. E. iii. 837; Zett. I. L. 382; Ratz. Ichn. d. Forst. i. 123; ii. 105; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 69; Tasch. Zeits. Ges. Nat. 1863, p. 300; Thoms. O. E. viii. 775 ♂ ♀. *X. Gravenhorstii*, Curt. B. E. pl. cccliii, ♀.\*

A somewhat shining and subrugulose punctate, black species with the abdomen partly red and stigma basally broadly white. Head tumidous, punctate and dilated behind the eyes, black with the mouth testaceous and mandibles basally castaneous. Antennae slender and pubescent; of ♂ immaculate; of ♀ with the eighth to thirteenth flagellar joints for the most part white; scape often badious beneath. Thorax immaculate; metathorax with five complete upper areae of which the areola is subhexagonal and the petiolar laterally produced to the short and distinct apophyses. Scutellum apically carinate. Abdomen black with the first segment coarctate and deeply impressed behind the spiracles, slightly curved, longer than the hind coxae and finely bicarinate throughout; the second linearly impressed in the basal angles, of ♀ transverse or of ♂ subquadrate; the two basal segments castaneous, of ♀ more rarely red or laterally black; third concolorous with the apex more or less broadly black, of ♀ rarely entirely black or castaneous; ♀ with the fourth to sixth ventral segments subprominent; terebra slightly longer than half

#### \* XYLONOMUS GRAVENHORSTII, CURT.

The three females standing under this name in the British Museum are from Stephens' collection, and are certainly synonymous with *X. irrigator*. They have the abdomen entirely pale castaneous and are small, with a total length of 7 mm. Curtis only knew two British species of the genus, *X. pilicornis* and his own *X. Gravenhorstii*; the latter, he says, is distinguished from the former "by its short antennae and ovipositor, and by its more slender form; the base and tip only of the abdomen are black; it is smooth, not rugose, and the longitudinal lines at the base are scarcely visible." He took two females "near London."

the abdomen, black with the spicula red. Legs normal, castaneous with the coxae and trochanters, except sometimes the anterior latter beneath, black; femora stout, usually more or less nigrescent towards the base; tibiae sometimes infusate but always paler before the base, the front ones internally testaceous or dull white, hind ones of ♂ sometimes nearly entirely nigrescent with their base alone red; intermediate tibiae of ♀ not tortuous, but internally towards the base deplanate. Wings more or less clouded; stigma black with nearly the basal half white; radix and tegulae infusate, the former sometimes piceous; nervellus intercepted nearly in the centre. Length, 8-14 mm.

Of the size and shape of *X. pilicornis*, but with the terebra shorter and stigma paler. Confusion appears to have arisen in Britain between this species and *X. pilicornis*, principally no doubt since Gravenhorst makes no mention of antennal pilosity and Taschenberg distinctly says "Fühler von gewöhnlicher Bildung"; Holmgren, however, represents both sexes "Antennae graciles, pubescentes" and Thomson "Antennis ♂ dense pubescentibus." The species appear best differentiated by the conformation of the scutellum and of the ♀ intermediate tibiae.

It was first described by Fabricius from Saxony specimens in Hübner's collection. Gravenhorst found it in May, June and October at piled timber near Breslau; Ratzeburg records that Wissmann bred it in the Hartz Mountains from *Rhagium indagator*, and perhaps it was raised also by Hartig (Jahresb. 1834, p. 433) from *Bombyx monacha*. This species was introduced as British by Marshall in 1870, and is the commonest of its genus on the Continent; but I know of no indigenous records and have never met with it myself.

#### 4. *pilicornis*, Grav.

*Xylonomus pilicornis*, Gr. I. E. iii. 833; Curt. B. E. pl. cccliii; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 69; Tasch. Zeits. Ges. Nat. 1863, p. 300; Thoms. O. E. viii. 775, ♂ ♀; Brisch. Schr. Nat. Ges. Danz. 1860, p. 127, ♂.

A somewhat shining and scabrously punctate, black species with the abdomen centrally red and antennae setiferous. Head black with the mouth testaceous. Antennae slender with the scape often pale beneath; of ♂ black and setaceous, a little shorter than the body and finely pubescent throughout; of ♀ filiform and a little explanate at the apex, rather longer than half the body and distinctly pilose apically, black with the ninth to thirteenth flagellar joints white. Thorax cylindrical and immaculate; metathorax scabrous with usually obsolete apophyses, its areae complete; basal area elongate and cariniform; areola pentagonal, not longer than broad and emitting costulae before the centre. Scutellum apically subreflexed at the sides. Abdomen subsessile, closely and coarsely punctate, black with the second and third segments castaneous or red, gastrocaeli of the former distinct, the basal segment rugulose and bicarinate; of ♂ elongate and parallel-sided, twice longer and a little narrower than the thorax, basal segment elongate and apically castaneous, the second subrugose and usually obsoletely bicarinate; of ♀ elongate-fusiform and as long and as broad as the thorax, basal segment coarctate behind the spiracles and entirely, with the fourth and fifth sometimes basally and laterally, red; terebra a little longer than the abdomen, black with the spicula badious. Legs slender and red with the hind ones elongate; tibiae not basally white, the anterior of ♀ internally towards the base obliquely impressed and tortuous; coxae, trochanters, hind tibiae and

more or less of the tarsi, black; femora before the base, or more rarely externally entirely, and in ♀ anterior tibiae externally in the centre, infusate; anterior tibiae of ♂ often fulvescent at base and apex. Wings somewhat narrow and more or less clouded; stigma and radix piceous, the former narrowly white at base, the latter sometimes stramineous; tegulae infusate and apically subtestaceous; nervellus opposite and intercepted slightly below centre. Length, 8-13 mm.\*

The abdomen is sometimes more or less infusate, and Gravenhorst mentions a ♀ with the basal segment apically and the third entirely black. The ♂ is more slender; and, Taschenberg says, has the abdomen sometimes entirely black and the coxae red; Brischke adds that the front coxae may be apically red, the hind tibiae only centrally black and their tarsi basally red.

Both sexes are at once known by the elongate flagellar pilosity; and differ from *X. irrigator* in the less strongly contracted basal segment, obsolete apophyses and longer terebra.

This species appears to constitute the type of Förster's genus *Sterotrichus* (Verh. pr. Rheinl. 1868, p. 169).

It has only been recorded in Britain from Coomb Wood and on a rail near Hampstead in May and June, and the female figured by him was taken (corrected in Ent. Soc. copy of B.E.) at Sevenoaks, by Curtis; Earham, near Norwich, by Bridgman; and Hastings in the Victoria History of Sussex. I possess, however, several females captured by Thornley at South Leverton, in Notts., and Peacock at Cadney, in Lincs. in June 1898 and 1902 respectively; Piffard has taken several of both sexes at Felden, in Herts.; and I have myself swept two males: at Wortham in Suffolk, in a marshy meadow in the morning of 9th June, 1900, and from a hedge-bottom in Wicken village, in Cambs., in the morning of 8th June, 1902. These two last males do not appear to be typical, since they are smaller than the average *X. pilicornis* and have the scutellum simple, not apically excised and raised on either side as in the typical form; they agree well enough with the very short diagnosis of his *X. glyptus* given by Thomson (O.E. viii. 776), but if this be a correct determination I have no hesitation in considering the latter but a variety of the present species, at all events until its female be discovered.

\* I thus described females, taken by Mr. Piffard, in 1900:—Head, viewed from above, nearly square, slightly broader than long, black; eyes not prominent; vertex somewhat coarsely but sparingly and unevenly punctate; face also coarsely but more thickly punctured, somewhat protuberant below the scapes; clypeus separated by a strong semicircular carina enclosing the base of mandibles, testaceous, concave and glabrous; maxillae small, black and simple at the apex; maxillary palpi black at base, ferruginous towards the apex with the apical joint long, slender and tapering. Antennae reaching to about apex of basal segment, and not to apex of wings; entirely black except a broad white ring at the apical third, midway between which and the extremity of flagellum is a row of rather long setae on the inner side, which vary somewhat in length. Thorax very long, cylindrical and black throughout; mesothorax with scutellar region twice as long as metathorax; mesonotum trilobed, discally flat, depressions scabrous and elevations punctate. Metathorax scabrous, areae complete; transverse ridge terminating in small lateral teeth; spiracles small, elongate and obliquely transverse. Scutellum and postscutellum convex; the former thickly and coarsely punctured, and preceded by a deep bordered fovea which is divided longitudinally in the centre by a carina; lateral postscutellar areae strongly and obliquely striated. Abdomen somewhat longitudinally scabrous at the base, gradually becoming finer towards the apex, apex of segment four and the following nearly smooth and subnitidulous; abdomen castaneous, part of third segment, apex of fourth and whole of following black; first segment half as long again as the second; eighth exerted, with a longitudinal sub-obsolete dorsal carina; first distinctly bicarinate longitudinally and depressed transversely behind the spiracles; second and third with thyridii. Terebra a little longer than abdomen. Legs somewhat dark red and short; all coxae and, for the most part, trochanters, black; all tarsi, base of posterior femora and whole of posterior tibiae nigrescent; tibiae distinctly thickened and flattened, especially the two front pairs; tarsi cylindrical, with the claws very minute. Wings greyish, transparent, narrow and not very ample; nervures well-defined and rather thick; interior and exterior discoidal recurrent interstitial; a small corneous expansion of the probranchial nervure just beyond its interception by the posterior discoidal recurrent; stigma, costa, radix, tegulae and nervures dark brown; just before the stigma the colour of the costa becomes for a short space white and pellucid. Length, 12½-13 mm.



5. *securicornis*, Holmgr.

*Xylonomus securicornis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 69. ♀

A small, hardly shining, subscabriculously punctate, black species with the abdomen entirely red. Head black and nitidulous with the vertex broad and obsoletely punctate; occiput not bordered, mouth piceous. Antennae obsoletely pilose at apex, gradually attenuate towards the base; scape red beneath; flagellum apically subclavate with the joints ten to twelve clear white. Thorax black and scabriculous; mesonotum subtransversely striate with distinct notauli; metathorax finely punctate with an apical mark on either side in the supracoxal areae red; apophyses distinct; areae subobsolete, basal very short and cariniform, areola subtriangular, emitting weak costulae from its centre; petiolar area subvertical and nearly smooth. Scutellum simple, its extreme apex truncate and basal fovea entire. Abdomen red with the basal segment margined, scabriculous and behind the spiracles coarctate, bicarinate at base only and not much longer than apically broad; segments strongly transverse and finely transaciculate; terebra a little longer than the abdomen, black with the spicula fulvous. Legs short, stout and dull red, with the coxae and trochanters black; tibiae not tortuous, but distinctly intumescant laterally before the constricted base; tarsi short, with the claws and apical joint infusate. Wings slightly clouded; stigma infusate with the base narrowly pale, radix and tegulae dull testaceous; nervellus opposite and intercepted exactly in the centre. Length, 2 lines.

At once known by the colour of the abdomen, the structure of the antennae and of the basal segment.

Holmgren only knew one female, taken in Sweden by Boheman; and no subsequent author appears to have noticed it. Bridgman recorded this species from Earlham (Trans. Norfolk Soc. 1893, p. 632) and there is a single female in his collection in the Norwich Castle Museum. I possess a second British example which was kindly presented to me by Mr. E. A. Butler on the 11th August, 1900; he had just captured it at Abinger Hammer near Dorking, in Surrey; it is only 4 mm. in length, with the terebra  $2\frac{1}{4}$  mm. This species has not been bred and the male is still unknown.

## PIMPLIDES.

The members of this Tribe are at once known from the whole of the other Ichneumonidae by the more or less distinct tubercles on either side of each segment of the abdomen, rendering its surface, which is also generally transversely impressed before the apex, of very uneven appearance; in some cases each segment is deeply marked by a triangular impression with its base resting on the apical margin and apex in the centre of the anterior. The body is occasionally brightly coloured, but for the most part the insects are black, strongly punctate and often nitidulous. The earlier genera comprise some of the longest of British ichneumons, though their form is so slender that in bulk they must yield to apparently smaller species. None of the species are very small and all have very definite characters, which are, however, not always apparent at first sight. I at first attempted to bring this Tribe more into line with the Xoridides, but I am now convinced that morphologically they have nothing in common with them.

*Table of Genera.*

- |       |  |                            |
|-------|--|----------------------------|
| (6).  | 1. Large species or central segments elongate; terebra longer than body. |                            |
| (3).  | 2. Mesonotum transversely rugulose ..                                    | RHYSSA, <i>Grav.</i>       |
| (2).  | 3. Mesonotum not transversely sculptured.                                |                            |
| (5).  | 4. Abdomen punctate; thorax black; onyches of ♀ basally lobate ..        | EPHIALTES, <i>Schr.</i>    |
| (4).  | 5. Abdomen glabrous; thorax red; onyches not lobate .. ..                | PERITHOUS, <i>Holmgr.</i>  |
| (1).  | 6. Smaller species or central segments rarely elongate; terebra shorter. |                            |
| (8).  | 7. Abdomen glabrous and nitidulous; body mainly flavous .. ..            | THERONIA, <i>Holmgr.</i>   |
| (7).  | 8. Abdomen usually coarsely punctate and body black.                     |                            |
| (16). | 9. Hypopygium not reaching base of terebra; areolet usually entire.      |                            |
| (15). | 10. Clypeus basally discreted throughout; femora normal.                 |                            |
| (12). | 11. Areolet entire; clypeus deeply impressed before apex .. ..           | PIMPLA, <i>Fab.</i>        |
| (11). | 12. Areolet wanting; clypeus not impressed before apex.                  |                            |
| (14). | 13. Mesonotum not cristulate; abdominal tubercles strong .. ..           | POLYSPHINCTA, <i>Grav.</i> |
| (13). | 14. Mesonotum cristulate; abdominal tubercles weak .. ..                 | ACRODACTYLA, <i>Hal.</i>   |
| (10). | 15. Clypeus not basally discreted; femora stout .. ..                    | SCHIZOPYGA, <i>Grav.</i>   |
| (9).  | 16. Hypopygium reaching terebra but not anus; areolet wanting.           |                            |
| (20). | 17. Central segments not obliquely impressed throughout.                 |                            |
| (19). | 18. Front femora emarginate beneath; terebra subexserted .. ..           | COLPOMERIA, <i>Holmgr.</i> |
| (18). | 19. Front femora entire; terebra distinctly exserted .. ..               | CLISTOPYGA, <i>Grav.</i>   |
| (17). | 20. Central segments obliquely impressed throughout.                     |                            |
| (22). | 21. Scutellum quadrate, apically truncate and laterally pale .. ..       | LYCORINA, <i>Holmgr.</i>   |
| (21). | 22. Scutellum normal and apically rounded .. ..                          | GLYPTA, <i>Grav.</i>       |

**RHYSSA**, *Gravenhorst*.

Gr. I. E. iii (1829), 260.

A genus of very large and strongly elongate species, with trans-striate mesonotum and terebra longer than the body. Head short, subbuccate and transverse, usually dilated behind the oval or subreniform eyes; clypeus very short, strongly transverse and generally a little produced centrally at the apex, often indistinctly discreted basally; mandibles basally broad. Antennae filiform, not attenuate apically, with the flagellar joints elongate. Thorax subcylindrical, discally deplanate; pronotum centrally glabrous;

mesonotum closely and regularly trans-striate throughout, with notauli entire and often deeply impressed; metanotum longitudinally canaliculate, areola rarely indicated; spiracles oblong or oval. Scutellum subconvex and apically obtuse. Abdomen cylindrical, sessile, smooth and shining, glabrous or obsoletely alutaceous; ♂ with the ventral valvulae exerted; ♀ with the anus subcompressed, the third segment not basally impressed, the eighth exerted and subtriangular, the apical ventral not reaching base of terebra, which is longer than the body with the sheaths not pilose. Legs, especially the hind pair, elongate; tarsal claws simple; posterior coxae subcylindrical. Wings ample, though not broad, with the areolet triangular, sessile or petiolate; the nervures disposed as are those of *Coleocentrus*.

This very distinct genus may be known by the transversely rugose thorax, somewhat relating it to *Xorides*, between which and *Coleocentrus* it would appear, as is pointed out by Thomson (O.E. 737), to form a transitional group of species. Holmgren split off those species of *Rhyssa* possessing no central clypeal tooth and having the abdomen entirely glabrous, creating for their reception the genus *Thalessa* (Ofv. 1859, p. 122). Since we possess but three of Gravenhorst's species and the two, which fall into *Thalessa*, are in need of confirmation as indigenous, it appears advisable to group them together, especially since the features of Holmgren's genus, which is synonymous with *Megarhyssa*, Ashmead (Canadian Entom. 1900, p. 368; *nec* Adams), are of so unimportant a character.

*Table of Species.*

- |      |   |                              |
|------|---|------------------------------|
| (2). | 1. Clypeus centrally produced; segments not emarginate (RHYSSA, <i>auctt.</i> )       | 1. PERSUASORIA, <i>Linn.</i> |
| (1). | 2. Clypeus truncate; central segments apically emarginate (THALESSA, <i>Holmgr.</i> ) |                              |
| (4). | 3. Scutellum and abdomen white-marked; areolet sessile                                | 2. LEUCOGRAPHA, <i>Grav.</i> |
| (3). | 4. Scutellum and abdomen black; areolet petiolate                                     | 4. CURVIPES, <i>Grav.</i>    |

1. *persuasoria*, *Linn.*

*Ichneumon persuasorius*, Linn. F. S. 400; Geer. Mem. I. pl. xxxvi, fig. 7; Panz. F. G. xix. 18; Don. B. I. xv. 522, ♀. *Pimpla persuasoria*, Fab. Piez. 112. *Rhyssa persuasoria*, Gr. I. E. iii. 267; Ste. Ill. M. vii. Suppl. p. 2, pl. xxxix, fig. 1. ♂; Ratz. Ichn. d. Forst. i. 121, pl. i, fig. 22; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 9; Tasch. Zeits. Ges. Nat. 1863, p. 251; Voll. Pinac. pl. xi. fig. 5 et 6, ♂ ♀.

Head laterally intumescent and as broad as the eyes, frons and face subglabrous; epistoma deplanate, clypeus narrow and centrally obtusely produced; palpi and all the orbits more or less white, though sometimes immaculate vertically; ♂ with the face also entirely white. Antennae filiform, shorter than the body, scape black; flagellum generally dull ferrugineous beneath or even entirely, with the joints elongate, apically nodulose and the basal one distinctly curved. Thorax subcylindrical, black; metanotum centrally canaliculate; propleural marks, pronotum broadly in front, a line before and a callosity beneath the radix, a mark above the intermediate coxae and another above the hind ones, which

latter sometimes coalesce across the apex of the metathorax, white. Scutellum and postscutellum entirely or apically white; very rarely black. Abdomen quite twice longer than head and thorax, cylindrical and about as broad as the latter, in ♀ subcompressed laterally; basal segment gradually constricted, of ♂ thrice longer than broad, glabrous and centrally canaliculate; one or two basal segments apically, and laterally towards the apex, white; second or third to seventh with lateral and infra-apical spots on either side more or less broadly white; terebra nearly a quarter again longer than the body. Legs elongate and somewhat slender, fulvous; coxae sometimes badius, or rarely in ♂ black, front ones of



♀ very rarely nearly totally black, the anterior in both sexes generally whitish beneath; hind tarsi and tibiae infuscate or rarely dull ferrugineous. Wings narrow and flavescent, with the stigma nigrescent; radix and tegulae white; areolet irregularly triangular, sessile or subpetiolate; first recurrent of lower wings strongly postfurcal and intercepted far above the centre. Length, 22-34 mm.

The ♂ is much the smaller and more uncommon sex.

Taschenberg, I believe, first found this species to be parasitic upon the blue Wood Wasp, *Sirix juvenis*; and Vollenhoven gives (Tijds. v. Ent. iv., p. 176, pl. xii.) a short description in Dutch, with figures, of the larva and pupa. The former, he says, is 2.5 Dutch duims in length, smooth and shining, with eighteen spiracles, each of which stands in a little pit-like depression with brown walls; in the female pupa, the terebra is reflexed and laid along the back, that of the ♂ is eighteen and that of the ♀ nineteen to twenty-two millimetres in length.

*Rhyssae* are found flying in pine woods, where the larvae of *Sirices* attack the solid timber, boring tunnels through the wood, as does the Goat Moth in deciduous trees. It is still a moot point whether *R. persuasoria* reaches these larvae by intruding its long terebra along the victims' burrows or actually, *in propria persona*, bores through the bark and solid wood to her prey. Fred. Smith exhibited a ♀ which "appeared" to have worked its ovipositor, bradawl-fashion, through a piece of fir wood; and Bond said that, at Bournemouth, he had found two of these ichneumons, with their ovipositors so firmly fixed in the wood that he could not remove them (*cf.* Meeting, Ent. Soc. April 1st, 1867, *et* E. M. M. 1865, p. 278). Gravenhorst tells us (*loc.*) that he found a ♀ on Mount Zobten, in Silesia,

sitting on a trunk with its terebra inserted in a cleft in the wood; it did not attempt to fly, but fell to the ground, and was easily taken by hand. Adams tells me it occurs at Lyndhurst, where *Sirex gigas* is common, every year; and he has seen the ♀ protruding its ovipositor as far as possible into the holes of this species of *Sirex* in fir posts. Miss Chawner also says it is common in her garden in Lyndhurst, running over rustic fences and poking its terebra into the holes of such small wood-boring bees as *Osmia*, &c.\*

In August, 1901, Bayford sent me a ♀ of this species with the following notes: "It was found in the act of ovipositing in a length of pine wood, one of a stack, in a wood flanking Hutton Bussel Moor, near Scarborough, on 19th inst. The insect stood with its legs almost vertical, clinging only by the tarsal claws, the abdomen erected semicircularly with the anus deflexed, while the ovipositor was inserted vertically into the wood in a line parallel with the legs." Another, taken at Storthes Hall, near Huddersfield, in July, by Roebuck, "had worked its ovipositor into the solid trunk of a pine, right up to its body," and left its terebra there. Nördlinger has raised this species from *Sirex spectrum*, in Germany; but Bignell is, I believe, the only author who records it from *S. gigas*; the latter took both sexes at Plymbridge in Devon, on 6th May. He figures it (Devon. Assoc., 1898, p. 460), as also does Wood (Insects at Home, pl. x., figg. 4 & 5). The former is of the opinion that they oviposit both through the *Sirex* holes—which he has observed—and through holes they themselves have drilled through the bark: he narrates the capture of a specimen with its terebra protruding half an inch beyond a half-inch thick piece of wood, through which it had bored. Felled trees are affected by this species, perhaps, more than living ones; and Burr has seen many ovipositing in a prostrate tree on sandy ground at Besselsleigh, in Berks.

This species, like its hosts, is probably somewhat local and I have never met with it myself; but there are many scattered records of its occurrence, due to its extremely conspicuous appearance and size, for it is certainly the longest of our indigenous Ichneumonidae. Donovan, in 1813, knew of but three British specimens, one of which was taken by Mr. W. J. Hooker of Norwich; Stephens (*l.c.*) says it is rare, but had been taken at Weybridge, Coombe Wood, near Kimpton in Hants., and at York; and mentions another from his first locality (Entom. 1842, p. 200). Curtis records it from Manchester and Norfolk. D'Orville took it at Alphenington about 1863 (E. M. M. 1865, p. 262); D'Urban met with it in fir plantations near Strete Raleigh and commonly at Newport (*lib. cit.*, ii. 71); and Dale at Glanvilles Wootton (Lep. Dorset. 77). It has also occurred at Bury St. Edmunds and Rushbrooke Park, in Suffolk, where *Sirex gigas* was unusually common, in June and July, 1903 (Tuck, Trans. Norfolk Soc., 1904, p. 635); Jacoby exhibited a specimen from Blandford at a meeting of the Ent. Soc. in 1900 (Oct. 3rd). Felden, Leighton Buzzard and Hamenstow, in Herts. (Piffard); Derbyshire (Wainwright); Ripple, near Dover, in 1901 (Sladen); Evans has recorded a ♀ in a wood-shed at Speybank, in Moray, on 30th June, 1901 (Ann. Scot. Nat. Hist. 1902, p. 56), and taken another in May at Fochabers, near Elgin; I have also seen a very small and dark ♀ taken at Aberdeen. Thornley took it near Grantham; Atmore

\* Miss Chawner adds (*in lit.*) "I once saw, on an old Tulip Tree, an ichneumon which was drab coloured and very large—I should say quite twice as large as the biggest *Rhyssa persuasoria* and much broader. Its ovipositor was long and it moved very sluggishly. I have never seen another." One wonders what this monster of 70 millimetres, or two-and-a-half inches can have been.

at Kings Lynn, in Norfolk; Hamm both sexes at Boars Hill, Oxford, in June; Routledge, near Carlisle; Porritt at Bishop Wood, Selby; Prof. Carr at Langford Moor, Notts., in June; Bridgman at Norwich and Sparham, in Norfolk; Day at Orton, near Carlisle. I possess specimens captured at Skipworth Vicarage, near Selby (Ash); Ipswich, near a timber yard, in 1895 (Baylis); both sexes from Shere, in Surrey (Capron); Ashby, near Doncaster, in May (Cassal); Ilfracombe (Bloomfield); females boring in dead fir posts near Sheffield and a ♂ at Worksop, in May (Miss Alderson); Essex (Harwood). Andrews took a female at Stradbally, on the south coast of Waterford, in Ireland, in 1906; and there are specimens in Marshall's collection (in Brit. Mus.) from Cornworthy and Totnes, in Devonshire. I cut both sexes of *S. gigas* from their borings in a pine post at Horning Ferry, Norfolk, in June, 1901, and Mr. Nevinson, who was staying there, had taken two or three females of *R. persuasoria* flying round the holes. Miss Alderson has noticed that when ovipositing this species will return to the same post shortly after having been very much alarmed.

Dr. R. T. Cassal has, I think, proved the ability of this species to bore through quite solid wood in the following note he has kindly sent me (*in lit.* 30. vi. 06): "I found one with the ovipositor buried up to the hilt in a recently felled larch trunk, forming the handrail of a bridge over a stream near Ballaugh, in the Isle of Man. The wood was quite hard, and is now, two years afterwards, quite hard. I could not pull the insect out for fear of breaking it, but, on holding it between my finger and thumb, it gradually wriggled the ovipositor out, and I had to wait over three minutes for the completion of the process. There were no holes in the wood and there are none yet; I am watching it every year."

## 2. *leucographa*, Grav.

*Rhyssa leucographa*, Gr. I. E. iii. 274; Ratz. Ichn. d. Forst. iii. 114, ♀. *R. leucogaster*, Tasch. Zeits. Ges. Nat. 1863, p. 251, ♀. *R. emarginata*, Holmgr. Ofv. 1859, p. 122, ♂. *Thalessa austriaca*, Tschek, Ver. z.-b. Ges. 1868, p. 269, ♂. *T. leucographa*, Schm. Opusc. Ichn. xv. 1150, ♂ ♀.

Head with the palpi testaceous, the internal and a line at the occipital orbits white; clypeus apically truncate and not centrally produced. Antennae longer than half the body, infuscate or dull ferrugineous. Thorax with two interrupted longitudinal mesonotal lines, lateral propleural marks, callosities beneath radix, a longitudinal line on either side of the sternum, metathoracic lateral and sometimes discal spots, white; notauli very distinct. Scutellum and postscutellum white-marked. Abdomen smooth and not alutaceous, of ♂ narrow with the third to seventh segments apically emarginate; basal segment immaculate or with two dots and the margin subtestaceous; second segment with two white dots on either side, of which the basal is oblique; the following segments, of which the third to the sixth have their lateral margins produced, bear one irregular or longitudinal white mark on either side; terebra twice the length of the body, infuscate with the spicula red. Legs fulvous, with the hind tibiae and tarsi ferrugineous, infuscate above. Wings hyaline or subfulvescent; stigma infuscate, radix and tegulae fulvous; areolet sessile and nearly regularly triangular. Length, 27-30 mm.

The ♂ may be further characterised as having:—The face laterally, the margins of the frons and a temporal spot, white. Flagellum rufescent beneath. Metathorax basally canaliculate. Abdomen black and nitidu-

lous, with the apices of the segments laterally rufescent; the basal finely canaliculate and usually with two white dots before the apex; the third to seventh segments discally emarginate, with the base of the emargination membranously piceous; valvulae half the length of the apical segment. Anterior coxae white-marked above and the posterior internally piceous; hind tibiae, tarsi and apices of their femora infusate, the first incrassate before the centre and basally constricted.

Marshall introduced this species as British in his 1870 Catalogus, probably on the strength of two females still standing under this name in Desvignes collection (in Brit. Mus.), which I have not examined. It is sparsely distributed throughout northern and central Europe, undoubtedly parasitic upon species of *Sirex*, though not yet bred, and usually found in company with *Ibalia cultellator*,\* whose victims are known to be the Siricidae.

### 3. *curvipes*, Grav.

*Rhyssa curvipes*, Gr. I. E. iii. 265; Voll. Pinac. pl. xi. fig. 7, ♀; Ratz. Ichn. d. Forst. ii. 104, ♂; cf. *lib. cit.* iii. 113; Tasch. Zeits. Ges. Nat. 1863, p. 251, ♂ ♀. *Thalessa curvipes*, Holmgr. Sv. Ak. Handl. 1860, n. 10. p. 10; Brisch. Schr. Nat. Ges. Danz. 1880, p. 109, ♂ ♀ cf. Thoms. O. E. xix. 2122.

Head with palpi and part or whole of the internal orbits stramineous; ♂ with the face and frontal orbits also pale stramineous. Antennae porrect, longer than half the body, infusate and beneath sufferrugineous; flagellum of ♀ slightly, of ♂ obviously, incrassate towards the apex. Thorax immaculate black, gibbulo-cylindrical; metathorax centrally subcanaliculate. Scutellum entirely black. Abdomen smooth, cylindrical, black, more than double length of head and thorax and as broad as the latter; basal segment centrally subcanaliculate and not longer than the hind coxae; fourth, fifth and seventh segments discally emarginate or third to sixth emarginate, more deeply in the ♂; anus a little compressed; terebra infusate and a little longer than body. Legs somewhat slender, fulvous; hind tarsi and tibiae entirely or partly infusate, the latter nearly straight in ♂, basally or throughout arcuate in ♀; apical tarsal joint double length of the penultimate. Wings normal, hyaline or slightly clouded; stigma stramineous or nigrescent; radius and radix stramineous; tegulae infusate or flavescent; areolet small, regular, petiolate. Length, 13-15 mm.

Thomson mentions a variety with the areolet entirely wanting externally.

There appears to me to be something inexplicable about the above description of authors: Ratzeburg says the first and base of the second segments of the ♂, and Taschenburg who examined Gravenhorst's two specimens of which one had the hind tibiae curved throughout and the other only at the base, gives this feature in both sexes; Holmgren was not sure that his species was identical with that of Gravenhorst and makes no

\* I may perhaps be pardoned a note on this parasitic Cynipid, which is so conspicuous and yet so rare that Cameron, describing it in 1890 (Phyt. Hym. iii. 261), believed it had not been found in Britain since the time of Curtis. This appears to be very nearly true, as far as any record goes, though Marshall tells us (E. M. M. 1895, p. 27) that two specimens were taken in March, 1888, at Hartlepool, where *Sirex noctilio* was unusually common. I recollect no later records of indigenous specimens. Late in 1900, Mr. Edward Saunders sent me a specimen captured, I believe, in Scotland by Col. Yerbury, during the preceding August. Last year I received a female for determination from Mr. Denison Koebuck, taken by H. H. Corbett at Doncaster in 1905; and Mr. A. H. Hamlin has just presented me with another specimen found by him at Tubney, near Oxford, in 1907. I also possess a male labelled "Valachie, Comana, A. C. Montandon."

mention of abdominal aciculation, as he certainly would if it were present, nor is such figured in Vollenhoven's detailed sketch of the abdomen. The colour of the stigma is stramineous in the original and nigrescent in Holmgren's species, and the tegulae paler. It seems probable that two species are mixed under this name, differing materially in the basal abdominal sculpture and slightly in colour; both six lines in length.

*Thalessa curvipes* is an uncommon species on the Continent, though widely distributed and apparently commoner in the north. Gravenhorst knew two females, from Hanover and Volhynia, in western Russia; Ratzeburg bred one male out of *Xiphydria Camelus* in the Hartz; Holmgren gives his species as *passim* throughout the whole of Sweden; Brischke records it from Prussia, Tosquinet from Carlsbourg, in Belgium, Kirchner from Vienna, where Dr. Giraud bred it from *Xiphydria dromiderius* (Ann. Soc. Fr. 1877, p. 410; cf. also Verh. z. b. Ges. 1854, p. 601).

On 15th June, 1907, I was walking through a thick, matted undergrowth of alder in Matley Bog in the New Forest, when I saw a large ichneumon, which I took to be *Ephialtes manifestator* alight on a twig of *Viburnum opulus*, about six feet from the ground and I promptly secured it; there had been much rain during the day and the herbage was still dripping. On examining it I discovered that it was an entirely black *Rhyssa*, with the legs entirely red: only two obsolete marks low down on either side of the face were pale and the apices of the hind tarsi obscurely infuscate. I am not sure that it is correctly assigned to the above somewhat inscrutable species, though from Holmgren's description it differs only in the matter of size, extending to  $22\frac{1}{2}$  mm.; the wings are clouded, the stigma black, the red hind tibiae distinctly arcuate at the base, the central segments emarginate, the flagellum subattenuate towards the base, and the maxillary palpi piceous with the fourth joint coarctate. It is remarkably like a melanic *R. persuasoria* in conformation and might easily be thought a very dark variety of that species if the clypeus, as is not the case, were centrally produced.

I can only believe it to be a very large *R. curvipes*, which has not previously been noted in Britain.

### EPHIALTES, *Schrank*.

Schr. F. B. ii (1802). 316 (*nec* Keys. Blas. Aves. 1840).

A genus of strongly linear and parallel-sided insects with the ovipositor never shorter than the length of the body. Head shortly transverse, a little buccate and hardly narrowed behind the oval and scarcely emarginate eyes; face subdeplanate, often pilose and not longer than broad; clypeus short and transverse, somewhat arcuately discreted with the apical margin centrally deflexed and excised, and the sides prominent; mandibles somewhat broad, only a little explanate basally and often striate, with the apical teeth short and subequal in length. Antennae filiform and somewhat slender; scape deeply excised externally; flagellum pilose with the basal joints cylindrical. Thorax convex and subcylindrical; mesonotum nitidulous with distinct notauli; lateral sulci deeply impressed and sternaui wanting; metathorax scabrous or rugulose with the pleurae smoother, somewhat higher than long with the areola obsolete or narrow and sulciform; petiolar area smooth, very short and basally incomplete; spiracles oval or circular. Scutellum a little convex, subtriangular and



not short. Abdomen sessile and cylindrical, scabrous, at least twice longer than thorax and generally bearing tubercles or rugosities; its segments generally elongate and always apically elevated and nitidulous; basal segment parallel-sided, not shorter than broad and centrally canaliculate with the spiracles before the centre; apical ventral segment small and retracted from the anus, of ♀ longitudinally excised; terebra at least as long as the body, with the valvulae more or less strongly pubescent and not deflexed; ♂ valvulae shortly exerted and often stout. Legs subelongate, very rarely dentate; apical tarsal joint twice or thrice longer than the penultimate; claws curved, not pectinate, of ♀ lobately dilated at the base. Wings not broad; areolet irregularly triangular, sessile or subpetiolate, emitting the recurrent nervure from beyond its centre; radial cell narrow and elongate.

Thomson very truly says (O. E. viii. 737) that this genus stands so close to *Pimpla* in the conformation of its species that no exact line of demarcation can be found between them. In general, however, the species may be known by the parallel-sided and cylindrical abdomen, which is not coarsely punctate and always has the apices of the segments broadly nitidulous, elevated and transaciculate, the ♀ has the sixth to eighth segments transverse and the ♂ the second strongly elongate; the flagellum is always entirely black with the joints of uniform breadth throughout, though not distinctly discreted; the eyes are not unusually prominent, the vertex is broad, the clypeus apically emarginate or excised and the terebra is not deflexed and thicker than in *Pimpla*.

As in *Rhyssa*, the males of this genus are much rarer than the females.

The large and conspicuous members of the present genus very early attracted the attention of entomologists and the observations of some of these, though too vague as to the actual species referred to, must not be altogether omitted, especially since the economy and habits of the whole group are probably identical. As long ago as 1741, Réaumur (Mém. vi. 304) perceived one of "the ichneumons, at the instant it alighted on the spot under which so many of the little green caterpillars had been stored up by the wasps. Its long tail it carried horizontally. . . . It moved its ovipositor so as to bring it into a bent position under the body, protruding it even beyond its own head; taking care to direct it into the barricaded nest of the mason wasp. But although the insect appeared not to be disturbed by my observations, yet I was unable to perceive whether the toothed portion of the borer was pushed beyond the sides of the sheath. What I did see, however, convinced me that the instrument was worked in a manner well adapted to make its way through the mortar; for she turned it half round alternately from right to left and left to right, as a carpenter would his bradawl, and employed altogether more than a quarter of an hour before she succeeded in penetrating to a sufficient depth." I quote from James Rennie (Insect Transformations, 1830, p. 57), who adds that "all the careful stratagems of the mason wasp (*Odynerus murarius*, L.) often prove ineffectual in guarding against the insidious intrusion of a common ichneumon fly (*Pimpla manifestator*, Grav.) easily known by its being black, with the legs red." (!) . . . "She waits patiently till the wasp, having laid in a store of caterpillars for the young one, closes up the doorway with a barricado of kneaded clay. It is this very barricado which the ichneumon determines to assail in order to find a nest ready prepared and stocked with provisions for her own progeny."

The most complete account we have of the habits of this genus is comprised in Thomas Marsham's "Observations on the Oeconomy of the *Ichneumon Manifestator*, Linn." (Trans. Linn. Soc. iii. [1797] pp. 23-29 et figg.) The affixed figures, however, certainly appear to agree very much better with *Ephialtes carbonarius* than the species indicated, and none of them are more than 17 mm. in length. He says that he first observed the insect, of which the male was unknown to him, sitting on an old post in Kensington Gardens on 9th June, 1787. It moves rapidly, carrying its antennae bent in the form of an arch and feeling with them with a strong vibratory motion till it finds the burrow of some insect and then thrusts them in to their base. Rev. William Kirby, quoting this, says (Mon. Apum Ang. i. 186) "In this instance, the antennae appear to have been the instrument which informed the little animal both where the holes were that she was in search of, and also whether the larva, to which the Author of Nature had instructed her to commit her eggs, was in them" (cf. also Kirby and Spence, 7th ed. 201). Marsham continues that the insect remains at least a minute in this position; withdraws her antennae; walks to exactly the opposite side of the same hole and again thrusts them in. Remains nearly as long on this side of the hole; withdraws them; alters its position; inserts them a third time and again withdraws them. Reverses its position, retracts abdomen over head and thorax and projects its spicula into the burrow. Its abdomen is then brought into a perpendicular position with the two valvulae standing directly upright. Thus it remains nearly two minutes; reverses and applies its antennae to the hole for nearly as long as before, and a second and a third time inserts spicula. It was then frightened away.

On the 16th of the same month many were at work; they appeared to pierce solid wood with their spicula, to half its length, and constantly passed it down the abdomen between the hind femora, which steadied it. It was, however, really inserted into the hole through fine white sand, which closed the burrows of *Apis maxillosa*. This insect is now known as *Chelostoma florissone*, L., and of it Kirby writes "In paxillis nidificat et lignis siccis *Ichneumonibus manifestatori, jaculatori et femoratori* K, obnoxia." (Mon. Apum Ang. ii. 251; cf. also Morl. Ichn. Brit. i. 28). Marsham continues that the ichneumon's whole body and hind legs are thrust into the hole, leaving exposed only its head, wings, anterior legs and apices of the valvulae. In October he saw another female on a post at Lessness Heath, near Erith, in Kent; it had its spicula fixed and, after waiting a considerable time, he forced it to withdraw it. He noticed the same species at work annually; and on 23rd July, 1791, saw one standing directly over a burrow of *Apis maxillosa*, with the terebra in the burrow and its hind femora steadying the abdomen. It frequently withdrew its terebra a quarter or three-eighths of an inch and then plunged it in again with great force, just before which effort the apex of the abdomen underwent a pulsatory movement, perhaps caused by the passage of the eggs. He observed that if the wind blows so strongly as to render the insect's position insecure through its action upon the ciliated valvulae during oviposition, these are brought forward between the legs and there held in safety. Marsham was evidently unacquainted with Réaumur's earlier Mémoires on the same subject or he would have remembered that the latter also represents his specimens thrusting their ovipositors through circular patches of dried clay, used to stop up the entrance hole of their burrows.

"But it is scarcely proved that the larva of *Chelostoma* was the object of attack: when we take into consideration the size of the parasitic larva and that of the bee, we are inclined to suspect that the *Pimpla*'s attack was upon some other insect. Where colonies of this bee are met with in posts and rails, there are usually also two Coleopterous insects, *Melandrya caraboides* and *Clytus arctis*, depositing their eggs; . . . it is possible that *Pimpla* attacks the larva of one of these insects, and not that of *Chelostoma*. The only ichneumon which I know from observation to be a parasite of *Chelostoma* is *Faenus assectator*: this insect has more than once been bred from its nests. . . . Mr. Kirby mentions, in connexion with his description of this bee, *Ichneumon femorator*, which his friend Mr. Trimmer found in the nest of *Chelostoma*" (Smith, Cat. Bees. Brit. 188). I consider it far more probable that *Clytus* was the host than the only bee suggested throughout the Pimplinae.

In this connection must be noted what Westwood (Introd. ii. 141: quoted by Wood in Insects at Home, 324) says respecting evidently another species of this genus or *Perithous*. "May 29, 1830, I observed a *Pimpla* with the ovipositor about as long as the body in the act of oviposition in a dry paling, which had been much perforated, and out of which I had just dug a black *Pemphredon*. The part in which the ovipositor was introduced appeared to be quite solid. There are several very minute blackish spots which were probably other places of insertion of the ovipositor. When first observed, the insect had introduced about half the spicula into the post, the part remaining uninserted being at a right angle with the body, the valvulae being curved, their tips being brought to the place of insertion, thus evidently strengthening the spicula in its operations; the abdomen was at this time alternately turned from left to right, and *vice versa*, whereby a bradawl kind of motion was given to the spicula, enabling it to penetrate the wood to a greater depth. It then alternately partially withdrew, and plunged the spicula into the hole thus made, as though in the act of passing an egg or eggs, standing all this while on the tips of the tarsi." No victim, however, was found at the other end of the ichneumon's boring, which by no means proves that such did not exist.

It will be at once seen from the above that the elongate terebra is used to reach larvae buried at some depth in wood or mortar, though the parasites appear nearly indifferent as to the species or even Order to which their victims belong, since *Ephialtes continuus*, Ratz., has been bred from both *Nematus laricis* and the swellings on poplar twigs caused by *Saperda populnea*; *E. glabratus*, Ratz., from *Tortrix strobilorum* and probably also *Ernobius abietis*; *E. populneus*, Ratz., from *Sesia hylaeiformis* and perhaps *Saperda populnea*, though the latter host is more doubtful than authors usually acknowledge; *E. discolor*, Brisch., from *Dasytes caeruleus* and *Exenterus balteatus*; *E. extensor*, Tasch., according to Schmiedeknecht's synonymy, from *Biorhiza terminalis* and *Grapholitha pactolana*. *E. pusillus*, Ratz., was once bred from *Molorchus umbellatarum* in apple wood by Nördlinger; and Taschenberg gives *E. messor*, Grav., as preying upon the wax moth (*Galleria mellonella*, L.) so destructive in British bee hives.

The members of this genus are easily divisible into groups, though the species of each are closely allied and all are similar in colour; the first two are large species with cylindrical abdomens and hardly any trace of tubercles; the two following are of medium size with the abdomen distinctly tuberculate and subfusiform; the remainder are all smaller, but sufficiently distinguishable by the features indicated in the following table.

## Table of Species.

- |       |     |   |                                |
|-------|-----|---|--------------------------------|
| (8).  | 1.  | Second recurrent of hind wing much shorter than base of radius; nervellus postfurcal.     |                                |
| (5).  | 2.  | Apical hind tarsal joint twice length of penultimate; tubercles obsolete.                 |                                |
| (4).  | 3.  | Stigma nigrescent; hind tarsi longer than tibiae  | 1. MANIFESTATOR, <i>Linn.</i>  |
| (3).  | 4.  | Stigma fulvous; hind tarsi not longer than tibiae   | 2. MESOCENTRUS, <i>Grav.</i>   |
| (2).  | 5.  | Apical hind tarsal joint thrice length of penultimate; tubercles strong.                  |                                |
| (7).  | 6.  | Metapleurae nitidulous; stigma and hind tibiae infusate                                   | 3. TUBERCULATUS, <i>Fourc.</i> |
| (6).  | 7.  | Metapleurae dull; stigma and hind tibiae fulvous  | 4. HETEROPUS, <i>Thoms.</i>    |
| (1).  | 8.  | Second recurrent of hind wings hardly shorter than base of radius; nervellus subopposite. |                                |
| (12). | 9.  | Mesosternum black.  |                                |
| (11). | 10. | Head transverse; radical callosities pale   | 5. CARBONARIUS, <i>Christ.</i> |
| (10). | 11. | Head cubical; radical callosities black   | 6. STROBILORUM, <i>Ratz.</i>   |
| (9).  | 12. | Mesosternum pale.   |                                |
| (14). | 13. | Head cubical, scutellum black, spicula white  | 7. ALBISPICULUS, <i>Morl.</i>  |
| (13). | 14. | Head transverse; scutellum and spicula red  | 8. RUFICOLLIS, <i>Desv.</i>    |

1. manifestator, *Linn.*

*Ichneumon manifestator*, Linn. S. N. ed. 10, 564; Poda, Ins. Graec. 105; Fab. E. S. ii. 162; Panz. F. G. xix. 21; cf. Marsham, Trans. Linn. Soc. iii. 26, pl. iv, ♀ (econ.). *I. adulterator*, Vill. Linn. Ent. iii. 192. *I. compunctor*, Schr. F. B. II. ii. no. 2067; Christ. Hym. 368, pl. xxxix, fig. 1. *Pimpla manifestator*, Fab. Piez. 113. *Ephialtes manifestator*, Gr. I. E. iii. 232, ♂ ♀ (excl. indiv. stigmatæ rufo); Kriech. Ent. Nachr. 1887, 251; lib. cit. xiii. 251; Schm.-Opusc. Ichn. 1120, ♂ ♀. *E. imperator*, Kriech. Stett. Ent. Zeit. 1854, p. 156; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 12; Tasch. Zeits. Ges. Nat. 1863, p. 253; Thoms. O. E. viii. 738, ♂ ♀.

A large, linear black species with dark stigma and obsolete tubercles. Head immaculate, posteriorly buccate but hardly broader than the eyes; vertex nitidulous and obsoletely punctate, somewhat broad behind the ocelli and with the occiput centrally emarginate; face nitidulous and slightly elevated longitudinally in the centre, with large, sparse punctures and black pilosity; clypeus not broad, centrally strongly depressed and punctate, produced into a truncate tooth on either side; mandibles broad, obsoletely punctate and centrally canaliculate towards the apex; palpi red. Antennae obsoletely pilose and entirely black; scape excised nearly to its base; flagellum filiform throughout, of ♀ reaching centre of abdomen and consisting of about 32 joints, of ♂ longer and 37-jointed. Thorax immaculate; mesonotum strongly nitidulous with short black pilosity, longitudinally coalesced punctures and the notauli reaching the centre; mesopleurae



and their sternum nitidulous and finely though distinctly punctate, with epicnemial entire and the lateral sulcus deeply impressed, sternauli wanting; metathorax scabrous and dull with the pleurae smoother and somewhat shining, the disc strongly bicarinate to the petiolar area which is longitudinally in the centre, though not basally, carinate; lateral costae entire, spiracles small and oval, apophyses wanting. Scutellum black, nitidulous, deplanate, subglabrous with sparse puncturation and black pilosity. Abdomen immaculate, parallel-sided, thrice longer though not broader than thorax, scabrous with the apices of the segments nitidulous and transaciculate; first segment twice longer than broad and hardly constricted basally, laterally explanate towards the base and apex, with no projecting spiracles; thyridii of second segment distinct and extending obliquely to near apex; segments two to five longer than broad and laterally subincrassate in the centre, though hardly tuberculate; fifth and sixth ventral segments of ♀ often strongly plicate; terebra two-fifths longer than the abdomen and a little longer than the body, distinctly and shortly pectinate throughout; ♂ valvulae large and apically incurved. Legs elongate, clear red with all the tarsal joints apically nodulose; first joint of front tarsi basally excised and its calcar curved; tarsal claws stout, curved and basally strongly lobate; hind tibiae and tarsi nigrescent, the former one-tenth in ♀ and two-fifths in ♂ shorter than the latter which has the apical joint twice longer than the penultimate; first joint of the front trochanters strongly constricted at its base; ♂ with apices of the hind femora black and extreme base of their tibiae red. Wings subhyaline and somewhat narrow; areolet triangular and sessile, nervelet distinct; stigma nigrescent with its base pale; radix and tegulae rufescent, or in ♂ ochreous; lower wing with the basal abscissa of the radius half as long again as the second recurrent nerve; nervellus strongly post-



furcal and intercepted far above the centre. Length, 21-35 (or 40) mm.

Kriechbaumer caused considerable confusion among the largest species of this genus by nominally dividing *E. manifestator*, Grav., into two species, *E. rex* and *E. imperator*, as given in the British catalogues; but, since he himself later found that *E. rex* was synonymous with Gravenhorst's *E. mesocentrus*, the original name of the present species has been restored by Schmiedeknecht, whose certainly correct synonymy I have followed throughout the genus. In fact, in a former attempt to come at an exact knowledge of its species, I had found them so involved, the descriptions so vague and the literature so scanty that it was only by drawing up the long diagnoses here given that I was enabled to at all distinguish between them; and these will not be out of place, since only the scientific distinctions have been, for the most part, hitherto published.

*E. manifestator*, is very closely allied to the next species beneath which are indicated points of sufficiently constant distinction to separate them.

Both here and in Sweden this species is much commoner than the following; in fact, it is distributed throughout Europe, and is the largest of its genus. Most of my specimens were taken by Col. Verbury, and it is this species, and not *Rhyssa persuasoria* that he said he had met with (Meeting of Ent. Soc. 3rd Oct., 1900) "in some numbers in Scotland. One female observed in the act of oviposition had thrust her ovipositor,

which is about the consistency of a human hair, through an inch of fir trunk" (*cf.* also E. M. M. 1904, p. 212). It occurs from the beginning of July to the middle of August; and he captured examples at Invershin, Nairn, Brodie, Nethy Bridge and Golspie in Sutherland. Mr. Perrins has found it at Ardross, in Ross. Mr. F. C. Adams has sent me the male from Lyndhurst, in the New Forest, taken as early as the 23rd June. The published records might with equal propriety appertain to the next species and must be regarded with some doubt, *e.g.*, I believe Bridgman's *E. imperator*, recorded as bred in Norfolk by Thouless from *Saperda populnea*, to be nothing but *E. carbonarius*; and it is so impossible now to tell to which of our species Thomas Marsham referred that I have thought it better to place his observations generically. I find this species recorded from Norfolk (Curtis); Scotland (Encycl. Brit. 7th ed. ix); as having been common about Great Yarmouth by Paget; as formerly found sparingly during the summer in Hainault Forest (Stockby, The Naturalist, 1854, p. 228); from Bottisham, Cambs., in autumn (Jenyns, Vict. Hist.); Essex (Harwood, Vict. Hist.); Bickleigh, Devon, in the middle of June (Bignell); Lands End (Marquand); and Bradley has, I believe, taken the female at Sutton, near Birmingham, on 9th September. Rev. William Kirby says (Introd. Ent. 7th ed. 64) that he had been stung by an ichneumon "of the family of *Pimpla manifestator*" with a very long ovipositor. It is parasitic upon xylophagous Coleoptera and Lepidoptera, though not yet bred in Britain. Bouché (Garteninsekten, 153) found it in *Callidium bajulus*, L.; the ♀ is well figured by Ratzeburg (Ichn. d. Forst. i. pl. vi. fig. 6), who says (*l.c.* i. 119) that a large and beautiful pupa of this Pimplid cut its way out of an old fir stump in which, judging by the borings, larvae of *Chalcophora mariana*, L., had been living; Kirchner gives it (Cat. 107) unhesitatingly as a parasite upon this Buprestid, but does not add as an alternative host *Saperda populnea*, from which Ratzeburg says (*l.c.* iii. 250) he also bred it. (*Cf.* Trans. Ent. Soc. 1907, p. 30). Taschenberg tells us, in 1863, that he raised the male perhaps from *Trypoxylon figulus*; and Brischke also bred it from the larva of *Sesia sphegiformis*, adding that the cocoon is elongate and yellow-brown. Confirmation of the above hosts is, however, very necessary.

## 2. *mesocentrus*, Grav.

*Ephialtes manifestator*, Gr. I. E. iii. 232, ♀ (excl. indiv. stigmatæ nigro). *E. mesocentrus*, Gr. lib. cit. iii. 249, ♂; Desv. Cat. 87, ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 13; Thoms. O. E. xiii. 1249, ♂ ♀; Kriech. Ent. Nachr. 1878, p. 193, ♀; *E. rex*, Kriech. Stett. Ent. Zeit. 1854, p. 156; Thoms. O. E. viii. 738, ♂ ♀; *cf.* lib. cit. xii. 1249; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 12, excl. ♂.

A large, linear black species with pale stigma and subobsolete tubercles. Head immaculate, posteriorly buccate but hardly broader than the eyes; vertex nitidulous and obsoletely punctate, somewhat broad behind the ocelli and with the occiput centrally emarginate; face somewhat dull and slightly elevated longitudinally in the centre, with large, somewhat close punctures and black pubescence; clypeus not broad, centrally strongly depressed and punctate, produced into a truncate tooth on either side; mandibles broad, obsoletely punctate and centrally canaliculate towards the apex; palpi red, of ♂ flavous or white. Antennae obsoletely pilose and entirely black; scape excised nearly to its base; flagellum filiform throughout, of ♂ nearly as long as the body. Thorax immaculate; mesonotum strongly nitidulous with short black pilosity, longitudinally

coalesced punctures and the notauli reaching the centre; mesopleurae and their sternum nitidulous and finely though distinctly punctate, with epicnemial entire and the lateral sulcus deeply impressed, sternauli wanting; metathorax scabrous and dull with the pleurae smoother and somewhat shining, the disc not very strongly bicarinate to the petiolar area which is neither centrally nor basally carinate; lateral costae entire, spiracles small and oval, apophyses wanting. Scutellum black, nitidulous, deplanate, subglabrous with sparse puncturation and black pilosity. Abdomen black, immaculate, parallel-sided, thrice longer and, in ♀, fully as broad as thorax, scabrous with the apices of the segments nitidulous and transaciculate; first segment nearly twice longer than broad and hardly constricted basally, laterally explanate towards the base and apex, with no projecting spiracles; thyridii of second segment very distinct and extending obliquely to near apex; segments two to five longer than broad and laterally incrassate in the centre, though hardly tuberculate; ♀ with the venter often plicate throughout; terebra three-fourths longer than the abdomen and distinctly longer than the body, obviously and elongately pectinate throughout; ♂ valvulae stout and obtuse. Legs elongate, clear red with all the tarsal joints apically nodulose; first joint of front tarsi basally excised and its calcar curved; tarsal claws stout, curved and basally lobate; hind tibiae and tarsi subinfusate and of equal length, latter with the apical joint fully twice longer than the penultimate; first joint of the front trochanters subconstricted at its base; ♂ with a stout, acute and prominent tooth on the outer side of the intermediate coxae, its front ones sometimes basally, and the hind femora apically, black. Wings subhyaline and somewhat narrow; areolet triangular and subpetiolate, nervelet punctiform; stigma clear red, though somewhat darker in the ♂; radix and tegulae rufescent, of ♂ pale flavous; lower wing with basal abscissa of the radius half as long again as the second recurrent nervure; nervellus strongly postfurcal and intercepted a little above the centre. Length, 18-30 mm.

This species is extremely closely allied to *E. manifestator* and the alar venation is identical; it was, as has already been pointed out, for long mixed with it in the female sex, though the male is abundantly distinct in the possession of an obvious intermediate coxal tooth. It may, however, be readily distinguished by the less nitidulous face which is more closely punctate, by the less distinctly bicarinate metanotum, broader ♀ abdomen which is centrally as well as apically plicate, the slightly longer terebra which is much more elongately pectinate externally, the stout and obtuse ♂ valvulae, the more red hind tibiae and tarsi which—it should be especially noticed—are of equal length, the rather longer apical tarsal joint, basally less constricted front trochanters, subpetiolate areolet, punctiform nervelet, clear fulvous ♀ stigma and less strongly postfurcal nervellus.

It is much rarer with us and on the Continent than *E. manifestator*, though it is said to be as widely distributed and to occur from June to September. Desvignes first introduced it as British in 1856, though I have little faith in his female which seems to agree better with my *E. albispiculus*. I possess but a single female, captured at Wyre on 24th September, 1892, and kindly presented by Mr. A. H. Martineau; Harwood records it, in Vict. Hist., from Essex; and there is a female, labelled "Rannoch" in Marshall's collection (in Brit. Mus.). Taschenberg bred the male of *E. rex* from *Sesia sphegiformis* and the same or the last-described species from *Trypoxylon jigulus* in Germany; Rondani adds that he has also bred it in Italy from *Coccyx (Retinia) resinana*, L.

3. *tuberculatus*, Fourc.

*Ichneumon tuberculatus*, Fourc. E. P. ii. 395. *I. leucopterus*, Gmel. S. N. i. 2699. *Ephialtes tuberculatus*, Gr. I. E. iii. 228; Zett. I. L. 374; Ratz. Ichn. d. Forst. ii. 100; Holmgr. Sv. Ak. Handl. 1860, n. 10, p 13; Thoms. O. E. viii. 740, ♂ ♀; Tasch. Zeits. Ges. Nat. 1863, 255, ♂ ♀. *Pimpla Reissigii*, Ratz. Ichn. d. Forst. ii. 89, ♀ ♂.

A large, sublinear black species with dark stigma and very distinct tubercles. Head black, with palpi flavidous and the clypeus often apically rufescent; vertex broad and strongly nitidulous, with a few fine and scattered punctures; occiput broad, bordered and hardly emarginate; face nitidulous and subdeplanate, with strong and sparse punctures; clypeus semicircularly depressed centrally and produced into a truncate tooth on either side; mandibles stout. Antennae filiform and obsoletely pilose throughout, of ♂ nearly as long as the body, of ♀ about half that length and consisting of 38 flagellar joints. Thorax immaculate, or in ♀ sometimes with a small testaceous callosity at the radix; notauli not reaching centre of the nitidulous mesonotum; epinemia entire, mesopleurae somewhat closely and strongly punctate, with the lateral sulci large and their region entirely glabrous, sternauli wanting; metathorax scabrous with the pleurae subglabrous, its disc bicarinate with the carinae a little divergent apically; spiracles subcircular. Scutellum black, subconvex, shining and not sparsely punctate. Abdomen immaculate, subcylindrical, fully as broad as and twice the length of the thorax, of ♂ longer and more slender; basal segment centrally strongly elevated and longitudinally canaliculate throughout; second obliquely impressed to its centre; the intermediate segments hardly longer than broad, or especially in ♂ slightly longer; sixth and seventh of ♀ ventrally protuberant; terebra one-sixth longer than the body, with the valvulae pilose and somewhat stout. Legs normal and red, of ♂ paler; front coxae of ♀ sometimes basally black; hind tarsi, their tibiae entirely or externally, and generally the apices of the ♀ femora, reddish-brown; apical joint of the hind tarsi thrice longer than the penultimate and all the claws very strongly lobate basally. Wings more or less clouded or silaceous in ♀; stigma dark piceous, basally paler; radix and tegulae ferrugineous or ochreous, sometimes flavidous; areolet nearly sessile and subirregularly triangular; lower wings with the basal abscissa of the radius half as long again as the second recurrent nervure; nervellus slightly postfurcal and intercepted a little above the centre. Length, 12-19 mm.



This species is at once distinguished from all our others of this genus, except the following, by its very distinctly tuberculate abdomen and more nitidulous appearance. From *E. heteropus* it may be known by its larger and stouter facies, more glabrous metapleurae, distinctly bicarinate metanotum, longer terebra, darker hind legs and especially by its infusate stigma.

It is distributed throughout Europe and is not very uncommon in Britain. Females in my collection were taken by Miss Chawner in the New Forest, by Donisthorpe flying round a birch tree at Rannoch, and by Col. Yerbury at Golspie in Sutherland and at Brodie, in July and August;



I have seen others captured at Rannoch by Porritt and Orton, in Cumberland, by Day at the beginning of July. It has been bred from *Saperda populnea*, by Thouless, in Norfolk (Bridgman); and captured at Plym Bridge, in Devon, early in June (Bignell). Giraud has also bred it from *S. populnea* in France and Brischke from the larva of *Sesia sphegiformis* in Prussia. Ratzeburg tells us (Ichn. d. Forst. ii. 100) that a single specimen was bred at the end of July at Hohenheim from a Weymouth pine, in which *Curculio pini* (*abietis*, L.) had lived; it had apparently emerged from an elongate cocoon, presumably of its own construction. He adds (*l.c.* iii. 250) that it was also raised from a species of Cerambycid, probably *Leipus fennicus*, Payk., and (*l.c.* ii. 90) that *Pimpla Reissigii* was bred by Reissig from alder, in which *Cryptorhynchus lapathi* lived. Schmiedeknecht gives *Rhagium mordax*, *Psilura monacha* and the very small *Hypomeuta cognatella* as alternative hosts. In the National Collection is a female taken by W. R. C. Grant at Glendole, in Forfarshire, early in September, 1898. Buckler tells us that it has also been bred in Britain from *Trochilium cynipiforme* by Abbott.

#### 4. heteropus, Thoms.

*Ephialtes heteropus*, Thoms. O. E. xii. 1249; Schm. Opusc. Ichn. 1129, ♀ (? ♂).

A large, sublinear black species with pale stigma and very distinct tubercles. Head black, with the palpi infusate and the clypeus rufescent; vertex broad and strongly nitidulous, with a few fine and scattered punctures; occiput broad, bordered and hardly emarginate; face nitidulous and subdeplanate, with strong and sparse punctures; clypeus semicircularly depressed centrally and produced into a truncate tooth on either side; mandibles stout. Antennae filiform and obsoletely pilose throughout, about half the length of the body and consisting of 38 joints in the flagellum. Thorax immaculate; notauli not reaching the centre of the nitidulous mesonotum; epinemia entire, mesopleurae somewhat closely and finely punctate, with the lateral sulci large and their region entirely glabrous, sternauli wanting; metathorax scabrous with the pleurae hardly smoother, its disc indistinctly bicarinate with the carinae indeterminately divergent apically; spiracles subcircular. Scutellum black, subconvex, shining and not closely punctate. Abdomen immaculate, subcylindrical, fully as broad as and twice the length of the thorax; basal segment not strongly elevated, longitudinally bicarinate throughout; second obliquely impressed to its centre; the intermediate segments not longer than broad; terebra less than one-sixth longer than the body, with the valvulae pilose and somewhat stout. Legs normal and entirely red; apical joint of the hind tarsi thrice longer than the penultimate, and all the claws lobate basally. Wings silaceous; stigma clear red; radix and tegulae ochraceous or rarely ferrugineous; areolet nearly sessile and subirregularly triangular; lower wings with the basal abscissa of the radius half as long again as the second recurrent nervure; nervellus slightly postfurcal and intercepted distinctly above the centre. ♀ Length, 12-17 mm.

Thomson (*l.c.*) compares this species with *E. abbreviatus* (O. E. viii. 740), which differs from *E. tuberculatus* mainly in having the epinemia abbreviated above; I must own that the present species appears little more than a variety of *E. tuberculatus* to me, differing in its infusate palpi, less glabrous metapleurae, more obsoletely bicarinate metanotum, slightly

shorter terebra—compare that of *E. carbonarius*—entirely red legs and stigma, and in its more shining and svelt appearance. It is very possibly synonymous with *E. tuberculatus*, var. 1, Grav.

It has not before been recorded from Britain, owing probably to its resemblance to *E. tuberculatus*, but is I think not rare with us. On the Continent it is only instanced from Lund, where Thomson says it was bred from the Musk Beetle, *Aromia moschata*. I possess three females of the above variable sizes, captured by Hamm in the city of Oxford in July, 1898; by Piffard at Feldon, in Herts., in 1899; and by Wainwright in Wyre Forest on 16th September, 1900. Elliott swept a female from rushes in Matley Bog in the New Forest on 18th June, 1907; I have seen *Aromia moschata* abundantly in the same spot in August.

### 5. *carbonarius*, Christ.

*Ichneumon carbonarius*, Christ, Hym. 365, pl. xxxviii, fig. 5. *I. leucopalpus*, Gmel. S. N. i. 2700. *Ephialtes carbonarius*, Gr. I. E. iii. 240, excl. var. 1; Ratz. Ichn. d. Forst. i. 119; ii. 99; iii. 109; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 14; Tasch. Zeits. Ges. Nat. 1863, p. 253; Thoms. O. E. viii. 724, ♂ ♀. *E. gracilis*, Schr. F. B. ii. 289; Gr. I. E. iii. 254; Zett. I. L. 373; Ratz. Ichn. d. Forst. iii. 109; Brisch Schr. Nat. Ges. Danz. 1880, p. 109, ♂.

A somewhat small species, with pale radical callosities and no tubercles. Head black and not as broad as the eyes, with the clypeus pale and palpi flavidous; vertex not broad, finely and somewhat closely punctate and pubescent with the occiput bordered and not emarginate; face finely, evenly and rather closely punctate, nitidulous, subdeplanate with long grey pilosity; clypeus strongly transverse, a little depressed centrally and not strongly produced on either side; mandibles stout with the lower tooth a little the longer. Antennae not longer than half in ♀ and three-quarters in ♂ of the body, filiform, black with the scape deeply excised and the flagellum consisting of 29 or 30 joints; ♂ with the two basal antennal joints usually flavous beneath. Thorax black, nitidulous, finely punctate and grey-pubescent throughout; notauli not reaching centre of mesonotum; a short sutural line, terminating in a concolorous callosity before the radix, stramineous; mesopleurae and sternum shining, finely and uniformly punctate, with the lateral sulcus deeply impressed, but no sternauli; metathorax somewhat longitudinally punctate and not scabrous, with its pleurae hardly smoother; central area distinct at most only at



base, whence it indeterminately diverges towards the centrally longitudinally substrigose petiolar area, which is apically but not basally bordered; spiracles quite circular. Scutellum subconvex and shining with very fine

puncturation and pilosity. Abdomen elongate, linear, black, not broader than and rather longer in ♀ than twice, in ♂ four times, the thorax with all the segments scabrous, apically nitidulous and elevated; basal segment not or hardly longer than broad, bicarinate obtusely towards the apex and divergently towards the base, with its sides slightly rounded and not explanate; the remaining segments elongate and not laterally tuberculate; the second obsoletely impressed obliquely from base to its basal third; the two basal ventral segments at most plicate; terebra one and three quarters to very nearly double the length of the body, black and strongly

pectinate with the spicula red; ♂ ventral valvulae elongate and apically acuminate. Legs not elongate, clear red with the hind tarsi and tibiae reddish brown and the extreme base of the latter whitish; ♂ with the anterior legs basally flavous and the hind tibiae internally whitish in the centre; first joint of front tarsi excised with the calcar internally emarginate and apically pectinate, basal joint of their trochanters subconstricted; penultimate hind tarsal joint very small and one third shorter than the apical, its claws small, curved and not very strongly lobate basally. Wings very slightly clouded, with the stigma piceous and basally paler; radix and tegulae dull flavidous; radius curved, areolet broad-triangular and subsessile, nervelet distinct; lower wings with the basal abscissa of the radius hardly longer than the second recurrent nervure; nervellus subopposite and intercepted in the centre. Length, 15-18 mm.

From its British congeners, this species is at once known by its size, the not or hardly bicarinate metanotum, lack of abdominal tubercles and the coloration of the ♂; the basal position of the external cubital nervure also appears distinctive. It is closely related to several Continental species, but may be at once recognised by the dense and white facial pubescence, the longer lower mandibular tooth, its elongate radical callosities, obsolete metanotal sulcus and the elongate, apically acuminate ♂ ventral valvulae.

It has a wide distribution through northern and central Europe and is certainly the commonest of its genus with us, though the male is very rarely met with; and is found on palings and flying about tree-trunks from late May to the end of September. It was recorded from England so long ago as 1634 under the name *Musca tripilia secunda* by T. Moufet\*; and it is very probable that Marsham's notes, already mentioned, refer to this species. I can, however, find no direct mention of the species before 1856, when examples existed in the British Museum. Fitch has bred both sexes somewhat doubtfully from *Cynips Kollari* galls (Entom. 1879, p. 116 et 1880, p. 258). It is recorded from Sussex (Morley, Vict. Hist.); Glanvilles Wootton, in Dorset (Dale); New Forest (Miss Chawner), where Donisthorpe took it inserting its terebra into the boring of *Callidium violaceum* (Ent. Rec. 1898, p. 303). I have seen specimens from Bury St. Edmunds, in June (Butler); Boars Hill, Oxford, in June (Hamm); Devon (Hocking); Shere, in Surrey (Capron); Feldon, in Herts. (Piffard); Lyndhurst in July, August and September (Adams); and Tostock, in Suffolk (Tuck). I have captured females at Bramford, in the same county, on 25th September; and not rarely in the middle of June, flying along a rush-screen, in Tuddenham Fen, in the vicinity of *Cryptorhynchus lapathi*, in 1900. The only male that has come under my notice was bred from—? *Sesia bembeciformis* in—osiers, at Boxworth in Cambs. by Thornhill, in the middle of June, 1902. I have also lately found it at Assington Thicks.

Ratzeburg bred this species in Germany (Ichn. d. Forst. i. 119) from a brood of *Pogonocherus pilosus*, Fab. (*dentatus*, Fourc.); and (l.c. ii. 99) a male, five and a half lines long with the scape stramineous beneath, the clypeus rufescent, face silky and remarkably short legs, out of *Salix Caprea* in which *Oberca oculata* had been boring (cf. Trans. Ent. Soc. 1907, p. 32); he also records it from *Saperda populnea*, *Cerambyx Heros*, *Pissodes notatus*,

\* "Talem anno 73, observavit Pennius semel tantum hanc muscam circa Hinningham, olim Comitatus Oxoniensis castrum videsse memorat Pennius: nisi semel in Cantio circa Greenhive visa perhibetur a Pennio." (Ins. Theatr. 64).

*Sesia myopiiformis* (l.c. iii. 109), *Pogonocherus fasciculatus* (p. 150) and *Tinea abietella* (p. 258). Probably several of the above records, especially the last, refer, as almost certainly does Gravenhorst's mention of the male with basally black coxae bred from *Abraxas grossulariata*, to some other insect: *E. gracilis*, Grav. was also several times bred from oak (Ichn. d. Forst. iii. 109) and sometimes *Dasytes—niger* (p. 251)—appeared with it, at others a *Crabro* and *Raphidia* (or *Hemerobius*—cf. p. 261). This species is said to be found a most effectual check to the propagation of the Codlin Moth (*Carpocapsa pomonella*) in the apple-growing districts of California.

## 6. *strobilorum*, Ratz.

*Pimpla strobilorum*, Ratz. Ichn. d. Forst. ii. 94; iii. 100, ♂ ♀. *Ephialtes strobilorum*, Tasch. Zeits. Ges. Nat. 1863, p. 254; Thoms. O. E. viii. 744; xix. 2124, ♂ ♀.

A shining black, unusually narrow and elongate species. Head strongly dilated behind the eyes, with the vertex very broad; palpi stramineous. Antennae black. Thorax black with no pale radical callosities; metathorax nearly entirely smooth, only centrally punctate and not canaliculate. Scutellum black. Abdomen subcompressed, higher than broad and very slender, black and very coarsely punctate, with the tubercles subobsolete; five basal segments longer than broad, the first subcanaliculate centrally; terebra straight and a little longer than the body, with the spicula stramineous. Legs yellow-brown; all the trochanters infusate with the base and apex whitish; all the coxae, the hind femora almost entirely and the apices of the straight hind tibiae, black; hind legs elongate and their tarsi nigrescent. Wings iridescent; radix and tegulae whitish, the latter with dark spots; stigma grey-brown. Length, 5.9 mm.

Ratzeburg says that the ♂ of this *Pimpla* differs from *P. linearis* only in its dark hind femora, apically darker hind tibiae and in having the abdomen more elongate with the four basal segments longer, though not long enough to place it in the genus *Ephialtes*. The abdomen is, however, very similar to that of *E. carbonarius*; and the species may be known in the present genus by the posteriorly very dilated head, basally black legs, of which the hind ones are dull red and the anterior femora and tibiae pale testaceous.

This species was first bred by Reissig in April and May from fir cones, containing *Anobrium abietis*, *Tortrix strobilana*, *T. resinana* and *Tinea abietella*. It was introduced as British (Trans. Ent. Soc. 1886, p. 366) on the strength of specimens of both sexes, which were bred by Bignell at the end of May and the beginning of June from *Coccyx strobilorum*, presumably not in Devonshire, since it does not figure in his county list (Devon. Assoc. 1898).

## 7. *albispiculus*, sp.n.

A very small, sublinear species with pale stigma and very obsolete tubercles. Head nearly cubical, black with the palpi fulvous and clypeus obscurely rufescent; vertex very broad and convex, nitidulous with a few isolated punctures and hairs, occiput bordered and centrally hardly emarginate; scrobes somewhat large; face convex and subglabrous with very sparse short pilosity; clypeus transverse, apically punctate, centrally deflexed

and emarginate; mandibles not stout, centrally canaliculate nearly to the base, with the teeth subequal. Antennae half length of the body, filiform, immaculate and subpilose with twenty-two flagellar joints, of which the apical is obtusely conical and somewhat large. Thorax black and nitidulous with the mesosterna, excepting the interpectoral sulcus, and obsolete callosities before the radices testaceous; notauli not reaching centre of mesonotum; metathorax convex, nitidulous and subglabrous throughout with only the lateral carinae, rising at the circular spiracles, indicated; petiolar area wanting and foveate on either side. Scutellum black and subdeplanate. Abdomen immaculate, strongly and coarsely punctate with the apices of the segments smoother and transaciculate; basal segment hardly half again longer than broad and bicarinate only to its centre; segments two to four subcompressed and a little longer than broad, the remainder transverse; venter dull flavidous; terebra exactly as long as the body, its valvulae black, elongately pectinate with their apices subacuminate and the spicula pure white with the apex alone castaneous. Legs entirely pale fulvous with the apices of the tarsi alone nigrescent; basal joint of the front tarsi emarginate with its calcar hardly curved; apical joint of hind tarsi twice longer than the penultimate, claws small and strongly lobate basally. Wings not at all clouded; stigma luteous; radix and tegulae pale fulvous; areolet triangular, much broader than long and distinctly sessile; lower wings with apical abscissa of radius about as long as the second recurrent nervure; nervellus subopposite and intercepted distinctly a little below the centre. ♀. Length, 7 mm.

It is closely allied by its buccate head with *E. strobilorum* and *E. glabratus*, Ratz., but differs in its red legs and distinctly sculptured abdomen. The curious white spicula leads one to conjecture if this could have been the female assigned to *E. mesocentrus* by Desvignes (Cat. 87).

The above description is drawn from a single female, which was bred in May, 1901, at Bristol from *Sesia tipuliformis* by Mr. H. J. Charbonnier, and is now in my collection.

### 8. *ruficollis*, Desv.

*Ephialtes ruficollis*, Desv. Cat. 88, ♀; Bridg. Trans. Ent. Soc. 1887, p. 376, ♂.

A somewhat small brown species with the thorax partly red. Head posteriorly narrower than the eyes, the mandibles ferrugineous with their base and the palpi white; face immaculate, finely and evenly punctate throughout, clothed with fine, sparse, silvery pilosity; clypeus transverse, shining, deeply discreted and apically depressed in the centre; mandibles broad and subglabrous, with the upper tooth slightly the longer; vertex finely punctate and shining, posteriorly emarginate in the centre, not narrow, with the occiput bordered. Antennae longer than half the body, basally dull red with the apical half often much paler; basal flagellar joints elongate and apically subnodulose; ♂ with the scape internally and beneath stramineous. Thorax subcylindrical; prothorax black, discally white; mesothorax red, with a propleural callosity before the radix stramineous; mesonotum evenly and distinctly punctate, with notauli reaching the centre; mesosternum in front, a central discal vitta, the scutellar and in ♂ specular regions, black; metathorax black, evenly punctate and pilose to near the glabrous apex, with no trace of areae nor costae, in ♂ centrally subcanaliculate; spiracles circular. Scutellum and postscutellum red, the latter and apex of the former often stramineous. Abdomen

linear and distinctly punctate throughout, with the apices of the segments glabrous and transversely subaciculate; basal segment of ♀ subquadrate, of ♂ twice longer than broad, nigrescent; the second elongate, with the third to fifth of equal length and longer than broad, rufopiceous with the apical margins always black; abdomen of ♂ usually black, with the second and third segments narrowly testaceous basally; venter stramineous, ♂ valvulae elongate; terebra very slender, pilose and longer than body with the spicula fulvous. Legs fulvous or red, with the anterior coxae flavous; hind tarsi apically infusate, with the apical joint about twice longer than the penultimate; claws simple and curved, with the pulvilli not small; ♂ trochanters stramineous, the hind ones often narrowly nigrescent above. Wings with the stigma and radix pale stramineous, and the areolet irregularly transverse-triangular; ordinary transverse nervure interstitial, nervellus subopposite and intercepted in its centre. Length, 10—12 mm.; terebra 15 mm.

Marshall treated this as a good species in 1870, but in his later Catalogue synonymised it with *Thalessa (Rhyssa) clavata*, Fab., from which the female materially differs in not having the mesonotum trans-striate, the face and basal segment immaculate, in its red scutellum and smaller size. Bridgman (*loc. cit.*) says it is a true *Ephialtes* and points out that, if *T. clavata* were introduced as British on the strength of this erroneous association, the latter must be omitted from our fauna. This is evidently the case, since Marshall has marked the whole *Thalessa* article in his 1872 Catalogue "*delendus*" and entered *E. ruficollis*, Desv., under *Ephialtes*. In coloration it is closely allied to *Perithous*; but the immaculate and pilose face, red scutellum and the relative length of the hind tarsal joints will at once distinguish it. It further has somewhat the facies of an extremely elongate *Pimpa pomorum*.

Desvignes' three female co-types are in the British Museum and I have drawn somewhat largely from them in the above description. An example of each sex has been bred by Barrett from an uninstanced lepidopterous host, and they are in the Bridgman collection at Norwich. I also possess a single specimen of both sexes; the female was captured at Cannock Chase by Mr. B. Tomlin during the first week of June, 1904, and the male taken by Dr. Capron about Shere, in Surrey, some twenty years ago.

### PERITHOUS, *Holmgren*.

Holmgr. Ofv. 1859. p. 123; Sv. Ak. Handl. 1860, n. 10, p. 15.

Head not buccate and behind the eyes distinctly constricted; frons unevenly impressed above the scrobes; face subtransverse and narrower than frons; clypeus arcuately discreted, deplanate, apically deeply emarginate though rarely subtruncate; mandibles basally broad, with teeth of equal length; juxta-antennal orbits slightly emarginate. Antennae filiform, with the scape excised. Thorax stout, longer than high, and laterally strongly nitidulous, usually tricolored; sternum deeply canaliculate and apically immarginate; notauli distinct; metathorax with the coxal and petiolar areae entirely punctate, the latter discreted from the wanting or incomplete areola by an arcuate costa; spiracles usually ovate. Abdomen subcylindrical and punctate, with the apices of the segments smoother; the first or first two longer than broad; the three following subquadrate, rarely elongate, with subobsolete lateral tubercles; terebra as long or

slightly longer than the abdomen. Legs normal, with the hind coxae subovate and femora stout; apical tarsal joint twice or more longer than the penultimate, with the claws neither pectinate nor basally lobately dilated. Wings as in *Ephialtes*, than which the whole body is more nitidulous.

*Table of Species.*

(2).	1. Thorax not red marked	.. ..	1. ALBICINCTUS, Grav.
(1).	2. Thorax mainly red		
(6).	3. Terebra as long as body; ♂ clypeus not strongly depressed		
(5).	4. Clypeus apically emarginate; cubital nervure angled	.. ..	2. MEDIATOR, Fab.
(4).	5. Clypeus apically truncate; cubital nervure curved	.. ..	3. VARIUS, Grav.
(3).	6. Terebra as long as abdomen; ♂ clypeus foveiform	.. ..	4. DIVINATOR, Rossi.

1. albicinctus, Grav.

*Ichneumon annulatorius*, Fab. S. E. 330; Piez. 62, ♂ (?). *Ephialtes albicinctus*, Gr. I. E. iii. 259, ♀; Desv. Tr. Ent. Soc. 1862, p. 226, ♂. *Perithous albicinctus*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 15, ♀.

Head of ♀ with the internal orbits, the palpi and base of the mandibles, white; of the ♂ with the face, the facial orbits and the mouth, pale, with a very slight rufescent tinge. Antennae of ♂ subsetaceous and a little longer than half the body; scape pale, remainder testaceous, beneath and infusate above. Thorax cylindrical and not red-marked; a line before, and in ♀ a callosity beneath, the radix whitish; prothorax immaculate. Scutellum and postscutellum of ♀ apically flavidous-white. Abdomen as broad as and thrice longer than the thorax, of ♂ sublinear and uneven with whitish pubescence; basal segment sessile, subcarinate and canaliculate; the five basal ♀ segments with their apical margin flavidous-white; ♂ with the two basal segments elongate and the remainder quadrate; terebra slightly longer than the abdomen, black with the spicula badius. Legs elongate, red; ♂ with the anterior coxae and all the trochanters white; front tarsi, tibiae and femora internally stramineous; hind tibiae and tarsi nigrescent, former in ♂ basally and internally, and latter in ♂ with the first joint basally, white. Wings slightly clouded, especially basally; stigma nigrescent, of ♂ rather large; radix and tegulae of ♀ ferrugineous, of ♂ white; areolet sessile and subirregular, metacarpus of ♂ infusate. Length, ♂ 8½, ♀ 15—18, mm.

Fabricius' species is described as having the scutellum flavescent, thoracic marks and the four basal segments margined with flavous, and the wings hyaline. Whatever name it may be known under nowadays *I. annulatorius* is certainly British, for it is recorded in Piez. (1804) simply, "Habitat in Anglia, Mus. Dom. Banks."

Although Desvignes described his ♂ as a new species, I am of the opinion that he intended it should be used in connection with that of Gravenhorst, of whom alone he was a close student, and it was probably the uncertainty of their relationship which led him to refrain from associating the sexes—an uncertainty which still exists in these less scrupulous times!

There can be no doubt that Desvignes' male appertains to this genus since his single specimen, which I have examined, still exists in the British Museum collection; it was "taken by F. Walker, Esq.," presumably in Britain, though such details of distribution hardly appear to have entered the heads of the older authors.

## 2. *mediator*, *Fab.*

*Pimpla mediator*, *Fab.* *Piez.* 117, ♀. *Ephialtes mediator*, *Gr.* *I.E.* iii. 256; *Zett.* *I.L.* 374; *Ratz.* *Ichn.* d. *Forst.* ii. 100; *Tasch.* *Zeits. Ges. Nat.* 1863, p. 256, ♂ ♀. *Perithous mediator*, *Holmgr.* *Sv. Ak. Handl.* 1860, n. 10, p. 15, ♂ ♀; *cf.* *Thoms.* *O.E.* viii. 744. *Pimpla (Ephialtes) senator*, *Hal.* *Ann. Nat. Hist.* 1839, p. 116, ♀. (?) *Ichneumon scurra*, *Panz.*, *F. G.* xcii. 6, ♀.

Head with the frontal orbits and mouth parts, except the apices of the mandibles, whitish; the very distinctly emarginate clypeus and whole face white in ♂, latter with the internal and vertical orbits only and the former sometimes with two dots white in ♀. Antennae shorter than the body; infusate and apically subferrugineous above, beneath testaceous with the two or four basal joints paler. Thorax black with the mesothorax red; prothorax immaculate; a line before and beneath the radix, a dot beneath the hind wings, and a sometimes red-margined transverse line or sinuate mark in the petiolar area, flavidous-white; metathorax discally punctate and shining. Scutellum red with its apex, sometimes its sides, and the postscutellum whitish. Abdomen shining, about thrice longer than thorax and broadest behind the centre; narrower in ♂; basal segment nearly parallel-sided, subcanaliculate and rarely immaculate; the seven basal segments apically discally and with the apical angles white; terebra somewhat longer than the body, black with the spicula red; apical ventral segment of ♂ obtusely rounded. Legs pale flavidous with the posterior of ♀, and more or less of the ♂ coxae and femora, red; hind tarsi, not distinctly dark-banded, their tibiae at apex and before base infusate. Wings flavescent or hyaline; stigma, radix and tegulae piceous or stramineous; areolet sessile, subirregular or nearly triangular. Length,  $6\frac{1}{2}$ —14 mm.

This species may be known from *P. varius* by the shape of the internal cubital nervure, which is centrally distinctly angled and emits a distinct nervelet, whereas in the latter it is evenly curved throughout with, especially in ♀, hardly a trace of a nervelet.

*Haliday (l.c.)* shortly describes *P. senator*:—Internal orbits white; mesothorax red, with white markings; segments white-margined, the intermediate subtransverse; terebra as long as body; legs red; length, 4 lines. He adds that it is "intermediate between *P. divinator* and *P. mediator*, resembling the first by its shorter figure and the form of the radial areolet, the latter in the length of the oviscapt;" but nobody has seen anything like it, and his description is too short and bears no features which do not equally well apply to *P. mediator*.

This is much the commonest species of the genus in Britain, and may be frequently swept among long herbage in June and July, as well as bred from bramble sticks. I have met with no direct instances of its parasitism upon Aculeata, although I saw a female investigating holes in a dead willow trunk tenanted by *Pemphredon lugubris* in my garden, at Monks' Soham, in September, 1907; on the contrary, it is said that Bouché bred



it from *Xyphidria camelus* and Ratzeburg from *Bombyx pini*, in Germany. It is recorded from the Lands End district by Marquand, Ivybridge in May and Bickleigh in June by Bignell, as bred in Devon from bramble sticks perforated by "one of the small wasps" by Parfitt, and at Norwich by Bridgman. I have seen specimens taken by Evans at Queensferry in the middle of August, Birmingham by Martineau, Guestling by Bloomfield, Felden in Herts. by Piffard, Greenings in June by W. Saunders, at Ely by Cross, the New Forest by Miss Chawner, on the window of Skipworth Vicarage, Yorks, by Ash, at Bury St. Edmunds and Aldeburgh in September by Tuck, Shere by Capron; and others bred at Oxford from bramble stems in June and July by Hamm, a female bred from osier at Cambridge early in July by Thornhill, and both sexes bred early in June at Blackheath from an apple branch by Beaumont. It has occurred to me at Ryde in the Isle of Wight, Lyndhurst and Knight Wood in the New Forest, and at Dennington and Lakenheath in Suffolk. Rosse Butterfield has bred it from bramble stems at Wilsden in Yorks, in the middle of June.

Veroeff at first (Verh. pr. Rheinl. 1891, p. 17) considered this species the commonest of its genus in the cells of the Aculeata in *Rubus* twigs at Bonn. He says it is parasitic upon *Chevriera unicolor* (*Pemphredon shuckardi*), *Stigmus pendulus* (*Solskyi*), *Psen atratus*, Dlb., *Pterochilus* (*Odynurus*) *laevipes* and *Xyphidria camelus*. Its occurrence in those of *P. laevipes* he regarded as of especial importance, since it was found behind four cells each containing a full-grown host-larva; here a female had emerged during the spring of 1890, but had been unable to effect an exit and had consequently died *in situ*, since the intervening larvae had not emerged at all that summer. He had observed a similar phenomenon in the case of *P. reniformis*. *P. mediator*, he adds, shows distinct proterandrie, males emerging during the first, and females during the second, week in May. Later (Zool. Jahr. 1892, p. 741), he states that this species only occurred to him singly, whereas *P. divinator* was abundant, in *Rubus* stems.

### 3. *varius*, Grav.

*Ephialtes varius*, Gr. I. E. iii. 254; Tasch. Zeits. Ges. Nat. 1863, p. 254, ♂ ♀. *Perithous varius*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 16, ♂ ♀; cf. Thoms. O. E. viii. 745. *Pimpla decorata*, Ratz. Ichn. d. Forst. ii. 96.

Head with the mouth and all the orbits stramineous; ♂ with whole face, ♀ with two dots beneath the scrobes, concolorous; clypeus apically subtruncate and hardly at all depressed. Antennae shorter than the body, infusate; scape whitish beneath; basal flagellar joints of ♀ pale, of ♂ dull stramineous, becoming gradually ferrugineous, beneath. Thorax black with the mesothorax nearly entirely, and sometimes the metapleurae and -notum mainly, red; pronotum of ♀ always white; a line before and a smaller one beneath the radix, an arcuate transverse line on the metathorax and sometimes a mark on the mesopleurae, flavidous-white; metanotum of ♀ alutaceous and dull, of ♂ obsoletely punctate and shining. Scutellum entirely or only apically white, postscutellum concolorous; disc of former usually red. Abdomen broadest in the centre, with all the segments apically white-margined; terebra a little longer than the body. Legs red and flavidous; hind coxae, at least of ♂, basally

black; apex and before base of the hind tibiae and apices of the posterior tarsal joints distinctly infusate. Wings hyaline; stigma piceous or stramineous; radix and tegulae whitish; areolet sessile and irregular. Length,  $6\frac{1}{2}$ —10 mm.

This is a somewhat more slender species than its congeners. It is very like *P. mediator*, but averages smaller and more slender, with the clypeus less depressed and hardly emarginate apically; the ♀ abdomen is more closely and distinctly punctate, with the first segment a little more constricted basally, the prothorax always white and the metathorax dull; the last ventral segment of the ♂ is apically narrower and not obtusely rounded, the legs are slightly paler with the hind coxae nearly always in part black; the wings are also said to be more clearly hyaline, with the areolet more broadly open.

*P. varius* does not appear to be a very common species in Britain, though it has been bred at Dover in July by Sladen, Bristol in May by Charbonnier, by Bignell in South Devon, and by Beaumont (E.M.M. 1895, p. 281) at Blackheath from a dead maple branch, together with *Pemphredon lugubris*, *P. morio*, *Homalus auratus*, etc. It has been captured by Tuck at Bury St. Edmunds, Tostock and Chippenham Fen, in Cambs.; several at Holgate, Yorks, in 1881 (Yorks. Nat. 1882, p. 108); and I have taken it flying to a post at Great Bealings, in Suffolk, at the end of July. Mr. Billups' record of several of this species having been raised from *Eupithecia absinthiata* (cf. Proc. S. Lond. Soc. 1896, p. 85) is probably an error.

#### 4. *divinator*, Rossi.

*Ichneumon divinator*, Rossi, F. E. ii. 48, ♀. *Ephialtes divinator*, Gr. I. F. iii. 252, ♂ ♀. *Ichneumon histrio*, Panz. F. G. xcii. 7.

Head with the mouth and, in ♂, whole face flavidous; ♀ with the internal orbits, and generally a transverse line beneath the strobæ, whitish; ♂ clypeus very strongly deflexed apically. Antennae rather longer than half the body, infusate; scape white, and flagellum pale or ferruginous, beneath. Thorax black, with mesothorax red; margin of propleurae usually flavescent; a line before and a smaller one beneath the radix, a callosity beneath the hind wings and a more or less distinct arcuate line in the petiolar area, pale flavous. Scutellum red, with its apex and the postscutellum flavous. Abdomen as broad as and nearly thrice longer than the thorax, of ♂ subcylindrical, of ♀ with the five basal segments gradually a little explanate; all the segments, sometimes narrowly, white-margined or rarely the first and fourth or fifth to seventh immaculate; terebra as long as, though hardly longer than, the abdomen, black with the spicula red. Legs red or fulvous with the hind tibiae, which in ♂ are pale stramineous, externally at the apex and before the base infusate; all the claws and apices of the hind tarsal joints, or nearly the whole of the hind tarsi, infusate. Wings hyaline; stigma piceous or, like the radix and tegulae, stramineous; areolet sessile and subirregular. Length,  $6\frac{1}{2}$ —10 mm.

Of the size and proportion of *P. mediator* and with the internal cubital nerve similarly conformed, but with the terebra and antennae shorter, and the latter a little stouter; the very strongly depressed clypeus will at once distinguish the ♂.

Besides preying upon *Cemonus*, *Pemphredon* and *Trypoxylon*, this species was thought by Fitch (Entom. 1880, p. 258) to have devoured the larvae of *Cynips Kollari*, though the parasite was not conclusively determined (cf. also Ratz. Ichn. d. Forst. ii. 108). It is very rarely seen on the wing or at large at all, though the specimens taken by Bridgman at Norwich, Tuck at Chippenham Fen in Cambs., Capron at Shere in Surrey, and Bloomfield at Guestling in Sussex were so caught. The more usual way of securing it is by gathering bramble sticks during the winter; by this method Parfitt has bred it in Devon, Martineau along with *Pemphredon lethifer* and *Elampus auratus* at Marston Green, near Birmingham (at Meeting, Birm. Ent. Soc. 20th Feb., 1905), Giraud from *Cemonus unicolor* and *Pemphredon lugubris* (Ann. Soc. France, 1877, p. 410); and Mr. Bowdler has sent me bramble stems from Blackpool, together with *Pemphredon lethifer*, *Perithous divinator* and *Elampus auratus*, bred from them. He tells me that in 1904 he bred forty *Pemphredon*, three male and seven female *Perithous* and seven *Elampus*, though whether the Pimplid was a primary or secondary parasite was not ascertained. That it is at least sometimes hyperparasitic upon the Chrysid was discovered by Kriechbaumer (Ent. Nachr. xxxvii, p. 480), who says that on 23rd March he took a fully coloured nymph of the *Perithous* out of a cocoon of *E. auratus*, and this completed its ecdysis on 27th June following: "hence it follows that the host-larva was only attacked when it was nearly or quite full grown, since I actually found two weeks ago the larvae as ectoparasites on full-grown *Chevrieria unicolor* (*Pemphredon Shuckardi*) larvae. The females of *Ephialtes divinator* therefore bore from outside, through the wood of the *Rubus* twigs, into the more or less grown larvae of their host; and the young *Ephialtes* larvae suck as ectoparasites on the back of the host. As *E. divinator* makes no cocoon, one only finds the larvae in one when the host-larva constructs it." He also instances *Odynerus* (*Hoplopus*) *lucripes* as an alternative host. Frisby bred five females and two males in 1907, from bramble stems, gathered during that spring at Redhill Common, together with *Pemphredon lethifer*. Adams has caught the female at Lyndhurst in the New Forest.

C. Verhoeff, of Bonn am Rhein, in his "Contributions to the Biology of the Hymenoptera" (Zool. Jahr. 1892, p. 741 *et seqq.*) gives an interesting account of the economy of this species, which he found much commoner in *Rubus* stems than *P. mediator*, with which indeed he appears to have at first confused it. He says that proterandrie always obtains in this species and gives a table showing that of eight specimens of the spring brood raised from *Psen atratus* all the males emerged first, one as early as the 7th March, though in the autumn brood one female emerged from *Chevrieria unicolor* on the last day of July and the final male not till August 6th, when the remainder of the females began to appear. They hibernate as fully grown larvae and are ectoparasitic, spinning no cocoon. For an account of their oviposition, one is referred to the Berl. Ent. Zeit. 1892, no. iv, "On the Biology of *Odynerus parietum*," which I have not seen. The most usual host of this species with him is *Chevrieria unicolor*, but he proved it also to prey upon *Stigmus pendulus* (*Solskyi*) and *Psen atratus*. For its parasitism upon *Hoplopus* (*Odynerus*) *lucripes*, cf. Biol. Aphor. p. 17. He asserts that the parasite has lived for countless generations with *Rubus* inhabitants, which are normally double brooded and that its larvae of the spring brood have inherited the habit of becoming imagines the following August; from these, which are abroad at about

the same time as the imagines of their hosts, are produced the hibernating larvae of the next winter. "For all Ichneumonidae," he continues, "it is advantageous to have several hosts, in order that they may be able properly to place an egg when necessary. It is probable that our *Ephialtes* only places its eggs in growing twigs, but in them it is desirable to have as many chances as possible. The female *Ephialtes* can only judge of present situation to a limited extent, and no one will believe she can see into the future." He then refers to the case of eggs being laid with *Hoplopus laevipes*, which is single brooded, with the result that the resulting imagines perish, since they can break through neither the hard shell of the host nor the surrounding bark of the *Rubus* twig; consequently the instinct to oviposit in single brooded hosts is not propagated to the offspring of so mistaken a parent. Next follows a table showing that in the cases of *Cheereria* and *Psene* the parasite emerges at the same time as, or at most a couple days before, its host. This he considers of importance, since, if it appears a little before its host, it either waits for the latter's emergence or, in spite of its weak jaws, works its way out unassisted, and in either case propagation is assured; but if, on the other hand, it does not emerge till after its host, those in the back cells of the *Rubus* twig will work through and injure or even kill the delicate nymph of the parasite in passing over it to the outer world. He makes no reference to the usual Ichneumonid habit of remaining quiescent for a period after having discarded the pupal envelope. I have discovered no descriptions of the larva or nymph of this well-known and oft-bred insect.

### THERONIA, *Holmgren*.

Holmgr. Ofv. 1859, p. 123; Sv. Ak. Handl. 1860, n. 10, p. 16.

Head short, transverse and declived behind the ocelli; clypeus not elongate, slightly elevated transversely in the centre and apically truncate; mandibles somewhat broad, with the apical teeth of equal length; eyes oblong, touching base of mandibles and emarginate next the scrobes. Antennae somewhat short and stout, filiform, with the scape externally excised and flagellar joints cylindrical. Thorax impunctate, stout and gibbulous, a little longer than high; notauli apically distinct; metanotum areated, spiracles large and elongate. Scutellum convex. Abdomen very smooth and not punctate discally; segments transverse and somewhat uneven, with the basal canaliculate; terebra emitted from a ventral fold, a third or a half the length of the abdomen. Legs somewhat stout, with the hind ones subincrassate; claws simple, pulvilli large; hind femora crenulate apically beneath. Wings with arcoleet sessile and irregularly subpentagonal.

This genus differs from *Pimpla* (*s.s.*), which it strongly resembles in shape and general facies, in its impunctate and entirely glabrous abdomen and incrassate hind femora; it may also be instantly recognised by the conspicuous coloration of its single species.

#### 1. *atalantae*, *Poda*.

*Ichneumon Atalantae*, Poda, Ins. Graec. 106. *I. speculator*, Scop. En. Car. 753. *I. scutellatus*, Fourc. E. P. 402. *I. flavicans*, Fab. E. S. ii. 182. *Pimpla flavicans*, Fab. Piez. 119; Gr. I. E. iii. 141; Ratz. Ichn. d. Forst. i. 118; ii. 97, ♂ ♀. *Theronia flavicans*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 16, ♂; Tasch. Zeits. Ges. Nat. 1863, p. 52; *lib. cit.* p. 256, ♂ ♀; cf. Voll. Schets. I, pl. iii, fig. 19.

Head fulvous or flavous with the vertex rufescent, rarely black-marked; eyes, ocelli and apices of the mandibles infusate; clypeus transverse, arcuately discreted and apically impressed; labrum shortly exserted. Antennae longer than half the body, fulvous-ferrugineous, with the scape generally paler beneath; basal half of flagellum with the joints transverse. Thorax very rarely entirely fulvidous, usually with larger or smaller marks on the sternum and pleurae black; the scutellar region and rarely the whole sternum black; a callosity beneath the radix flavous, and two sometimes obsolete discal vittae pale fulvous with the intermediate space infusate; metanotum with three distinct basal areas, of which the central is quadrate. Scutellum and postscutellum flavidous. Abdomen broadest centrally, of ♂ cylindrical, narrower and nearly twice longer than thorax and head, of ♀ hardly at all longer and as broad, oblong-ovate; fulvous or fusco-testaceous with the margins of the segments flavescens; first segment generally basally black, the second to the sixth with the base entirely, in the form of a transverse line or two dots, black, rarely also with a discal mark nigrescent; terebra black, with the spicula fulvous or castaneous. Legs fulvous with the front coxae and trochanters generally flavous beneath; posterior coxae black-marked, the hind ones sometimes entirely fulvous or nearly entirely black; hind femora generally with a black mark or longitudinal line beneath. Wings flavescent with the stigma, radix and tegulae concolorous. Length, 6—15 mm.

This is a very common species on the Continent, especially in the central and southern regions, occurring on house windows, in woods and on flowers of *Chacrophyllum bulbosum* from May to September (Grav. 1829 to Tosquinet, 1897). It has frequently been bred from a large variety of lepidopterous hosts: Poda first raised it from the pupae of *Papilio atalanta*; Scharfenberg and Brischke from *Abraxas grossulariata* and the cocoons of *Bombyx neustria*; Olivier and Kichmann from pupae of *B. chrysorrhoea*; Gravenhorst from pupae of *Papilio polychloros*; Ratzeburg from *Papilio crataegi*, *Bombyx pini*, *B. dispar* and *Tortrix viridana*; Brischke from *Eurycyon verticalis* and *Pionia forficatis*; and Taschenberg from *Limonitis camilla* and *Sciaphila penziana*, adding that it hibernates beneath foliage. Brischke says (Schr. Nat. Ges. Danz. 1880, p. 111) that he bred it hyperparasitically, through cocoons of both sexes of *Limneria tricolor*, Htg., from a larva of *A. glossulariata* in Prussia. A fungus, *Entomophthora sphaerosperma*, Fres., was found by Kirchner (Cat. 107) to attack the wings of this species.

It is a most remarkable circumstance that this large and very conspicuous insect has not been seen in Britain since Stephens' time; there are two males and two females of his in the National Collection, but surely if it were indigenous it would have turned up somewhere in the course of the last fifty years.

### PIMPLA, Fabricius.

Fab. Piez. (1804) p. 112.

Head transverse, rarely subcubical, short and broad, somewhat narrowed behind the usually internally emarginate eyes; frons generally impressed, smooth and nitidulous, centrally subconcave and longitudinally canaliculate with the scrobes large and not deeply impressed; clypeus basally distinctly discreted, towards the apex strongly depressed, and often more or less strongly emarginate at the apex; labrum exserted and elongately

pilose; cheeks of variable length; mandibles narrowed towards their apices with two apical teeth of equal length, often bordered and obsoletely punctate. Antennae filiform or somewhat attenuate towards the base with the joints cylindrical and the basal ones rarely apically subnodulose; scape strongly excised externally and sometimes pale beneath in ♂. Thorax stout, convex, often pilose and shining, rarely red and not frequently with flavidous discal marks on the notum and scutellum; notauli usually obsolete; metathorax short with only two longitudinal carinae indicating the areola, very rarely with the lateral areolae entire; petiolar area rarely basally costate and never discreted; spiracles oval, ovate, uncommonly elongate, but generally small and circular. Scutellum somewhat convex, basally foveate and apically rounded, red, flavous-marked, but in the great majority black. Abdomen broadly sessile and centrally more or less broadly explanate or subfusiform, in ♂ not uncommonly linear or subcylindrical; basal segment basally broadly excavate and at least there bicarinate, often centrally subelevated, and laterally shagreened or rugulose, spiracles before the centre, never much longer than broad in ♀ and not often in ♂; remaining segments usually distinctly broader than long, especially in ♀, with the surface strongly punctate, distinctly uneven, laterally tuberculate, transversely impressed before the elevated and usually nitidulous apical margin; two apical ventral segments of ♀ discreted for the passage of the terebra, which is always exerted and varies in length from shorter than the basal segment to longer than the whole body, though usually somewhat shorter than the abdomen. Legs short and stout, femora more or less incrassate, front ones of ♂ sometimes distinctly emarginate beneath and their tibiae rarely arcuate; onychii sometimes strongly explanate and the claws more usually with a small distinct tooth just before their base; tarsal joints of variable length, the basal rarely setigerous beneath. Wings with the areolet complete, though sometimes externally pellucid, and irregularly broad triangular; nervellus intercepting at various points, but never wanting.

This genus contains many of the commonest and from old best known species of ichneumons, which are everywhere to be met with during the summer with us. Like many others, it has been the practice to treat this genus too much as though self-contained; and I have found it necessary to rearrange the species found in Britain in order to bring it into line with *Ephialtes* and *Polysphincta*, which, though themselves very widely distinct, are obviously connected by the multitudinous and to some extent heterogeneous species of *Pimpla*. These have been divided by Thomson (Förster's divisions are silly, inadequate and not worthy to be treated as genera) into several very natural subgenera, which, however, with our "scanty British fauna,"\* it is not necessary to adopt, excepting as convenient divisions of the main genus; to these I have added *Scambus*, Htg., to which Tschek's *P. ventricosa* certainly belongs, though the females are somewhat difficult to distinguish. *P. roborator* is certainly allied to *Ephialtes extensor*, Panz. and *E. tuberculatus*, and on the other hand to Thomson's genus *Epiurus*, which includes the majority of our *Pimplae*; this, through *Delomerista* with smooth abdomen, naturally leads to *Pimpla*, s. s., which bears but obsolete tubercles and differs from *Hoplctis* primarily in its filiform flagellum, though closely related in the spiracular conformation and tibial colour. To the latter *Apechthis* is allied in the

\*Dr. Schaum, Berl. Ent. Zeit. 1848, p. 34.—The insects, as far as I can judge, total roughly 14,500 species (those of Suffolk alone 6,300).—C.M.

basally attenuate antennae and obsoletely tuberculate body, and differs from *Tromatobia* in the shape of the spiracles and its indistinctly lobate onyches. This is certainly very closely allied to *Polysphincta* in the often externally pellucid areolet and smoothish body, which is far less deeply punctate than in *Ephialtes*, *Epiurus* and *Pimpla* proper; moreover they also prey upon Arachnida, though upon the eggs and not the imagines, in the egg-sac and not ektoparasitically.

Marshall, in the Ent. Ann. 1874, p. 126, makes the sweeping statement that "*Pimpla* undergoes its transformations without any other covering than the skin of its victim." But this is only true in part and especially of the restricted genus. I have shown that *P. oculatoria* spins for itself cocoons within the egg-sac; Bignell states that the cocoons of *P. rufipleuræ* are very like those of the Braconidous genus *Macrocentrus* and woven upon one another; I have pointed out that those of *P. didyma* (of which the last is not, as I had first thought possible from the figure, a variety) are arranged in a similar manner, without possibility of error, as also are those of *P. similis* and *P. detrita* lives in galls, constructing no cocoon; but we know too little of the earlier stages at present to form an opinion as to how far the mode of pupation will prove Thomson's genera to be natural; we can but surmise that *Epiurus* and *Scambus* construct a stout, brown, papyraceous cocoon, *Tromatobia* a flimsy, white, translucent cocoon, *Pimpla* and *Apechthis* and *Itoplectis* no cocoon at all, simply lying free in their host's chrysalis.

*Pimpla* is represented in the palaearctic region by some seventy-seven species, excluding nearly twenty of doubtful distinction described by Ratzeburg, and does not appear to be rare in tropical countries. Of these Marshall presented 21 from Britain in 1872, and I found a total of 37 in 1901. Many of these have proved to be synonymous, or, like *P. abdominalis*, to have been incorrectly ascribed to this genus; with the result that, after adding five species to our fauna and describing three new ones, our total stands at 40 species, of which I do not possess *P. pictipes* and *P. aethiops*.

#### Table of Species.

- |       |  |                             |
|-------|--|-----------------------------|
| (50). | 1. Clypeus apically emarginate; nervellus intercepting very rarely above centre; metathoracic spiracles always circular. |                             |
| (5).  | 2. Abdomen very strongly punctate; terebra longer than body ( <i>Exeristes</i> , Först.)                                 |                             |
| (4).  | 3. Tarsal claws basally dentate; thorax black  | 1. ROBORATOR, <i>Fab.</i>   |
| (3).  | 4. Tarsal claws not basally dentate; thorax red  | 2. RUFICOLLIS, <i>Grav.</i> |
| (2).  | 5. Abdomen normally punctate; terebra rarely as long as body.  |                             |
| (49). | 6. Lateral metathoracic areae wanting; cheeks black.   |                             |
| (38). | 7. Front femora of ♂ entire; abdomen of ♀ distinctly tuberculate ( <i>Epiurus</i> , <i>auctt.</i> ).                     |                             |
| (27). | 8. Nervellus intercepting not below the centre; antennae longer than half body.  |                             |

- (12). 9. Hind coxae distinctly punctate ;  
nervellus intercepting above centre.
- (11). 10. Hind coxae red and coarsely granulate beneath . . . . . 3. GRAMINELLAE, *Holm.*
- (10). 11. Hind coxae black and normally punctate beneath . . . . . 4. HIBERNICA, *Morl.*
- (9). 12. Hind coxae subglabrous ; nervellus intercepting in centre.
- (22). 13. Onychii simple ; abdomen not double length of head and thorax.
- (15). 14. Face at least laterally pale ; abdomen cylindrical . . . . . 5. RUFIPLEURA, *Bignell.*
- (14). 15. Face immaculate ; abdomen centrally subexplanate.
- (21). 16. Black ; terebra longer than half abdomen.
- (18). 17. Apical hind tarsal joint not longer than the third . . . . . 6. INQUISITOR, *Scop.*
- (17). 18. Apical hind tarsal joint distinctly longer than the third.
- (20). 19. Metathorax subglabrous throughout. . . . . 7. SIMILIS, *Bridg.*
- (19). 20. Metathorax always distinctly bicosate discally . . . . . 8. ROBUSTA, *Morl.*
- (16). 21. Red ; terebra hardly half length of abdomen . . . . . 9. TASCHENBERGI, *DT.*
- (13). 22. Onychii explanate ; abdomen double length of head and thorax.
- (26). 23. Hind onychii four times length of penultimate joint.
- (25). 24. Head transverse ; thorax red and subfusiform . . . . . 10. DILUTA, *Ratz.*
- (24). 25. Head subcubical ; thorax black and cylindrical . . . . . 11. MELANOCEPHALA, *Gr.*
- (23). 26. Hind onychii hardly thrice length of penultimate joint . . . . . 12. ARUNDINATOR, *Fab.*
- (8). 27. Nervellus intercepting below the centre ; antennae not longer than half body.
- (29). 28. Face flavous or flavous-marked . . . . . 13. DIDYMA, *Grav.*
- (28). 29. Face immaculate.
- (35). 30. Basal segment distinctly punctate laterally.
- (34). 31. Nervellus intercepting slightly below centre ; thorax black.
- (33). 32. Larger ; abdomen fusiform and stout . . . . . 14. BREVICORNIS, *Grav.*
- (32). 33. Smaller ; abdomen cylindrical and slender . . . . . 15. PUNCTIVENTRIS, *Th.*
- (31). 34. Nervellus intercepting far below centre ; thorax of ♀ red . . . . . 16. POMORUM, *Ratz.*
- (30). 35. Basal segment irregularly shagreened laterally.
- (37). 36. Nervellus intercepting far below centre ; terebra as long as abdomen . . . . . 17. GALLICOLA, *Morl.*
- (36). 37. Nervellus intercepting slightly below centre ; terebra shorter than the abdomen . . . . . 18. PICTIPES, *Grav.*
- (7). 38. Front femora of ♂ emarginate beneath ; abdomen of ♀ hardly tuberculate (SCAMBUS, *Htg.*)



- (48). 39. Ocelli not elevated; wings normal.  
 (41). 40. Hind femora nigrescent; front tibiae  
 of ♂ strongly arcuate . . . . . 19. SAGAX, *Htg.*  
 (40). 41. Hind femora fulvous; front tibiae not  
 or in ♂ hardly arcuate.  
 (45). 42. Nervellus intercepting below the  
 centre.  
 (44). 43. Central segments apically elevated  
 and shining; ♂ scape black . . . . . 20. CALOBATA, *Grav.*  
 (43). 44. Central segments not apically ele-  
 vated; ♂ scape white beneath . . . . . 21. NUCUM, *Ratz.*  
 (42). 45. Nervellus intercepting in the centre.  
 (47). 46. Basal segment of ♂ thrice longer  
 than broad; terebra longer than  
 body . . . . . 22. INANIS, *Schr.*  
 (46). 47. Basal segment of ♂ twice longer  
 than broad; terebra shorter than  
 abdomen . . . . . 23. DETRITA, *Holmgr.*  
 (39). 48. Ocelli elevated and circumcanalicu-  
 late; wings broad . . . . . 24. VENTRICOSA, *Tchk.*  
 (6). 49. Lateral metathoracic areae entire;  
 cheeks stramineous (DELOMER-  
 ISTA, *Thoms.*) . . . . . 25. MANDIBULARIS, *Gr.*
- (1). 50. Clypeus not apically emarginate;  
 nervellus intercepting always above  
 centre; metathoracic spiracles  
 usually elongate.  
 (72). 51. Notauli obsolete; frontal orbits very  
 rarely pale; tarsal claws not or  
 very obsoletely dentate basally.  
 (61). 52. Spiracles large, ovate; flagellum  
 filiform; cheeks not short (PIMPLA,  
*Thoms.*)  
 (58). 53. Spiracles oblong; hind tibiae uni-  
 colorous, rarely red-banded.  
 (55). 54. Scutellum glabrous; hind femora  
 and tibiae unicolorous red . . . . . 26. INSTIGATOR, *Fab.*  
 (54). 55. Scutellum punctate; hind legs part-  
 ly or entirely black.  
 (57). 56. Large, dull; body not shining;  
 hind tibiae immaculate . . . . . 27. AETHIOPS, *Curt.*  
 (56). 57. Smaller, body normally nitidulous,  
 hind tibiae red-banded . . . . . 28. ARCTICA, *Zett.*  
 (53). 58. Spiracles oval; hind tibiae pale-  
 banded.  
 (60). 59. Coxae black . . . . . 29. EXAMINATOR, *Fab.*  
 (59). 60. Coxae red . . . . . 30. TURIONELLAE, *Linn.*  
 (52). 61. Spiracles small and often circular;  
 flagellum basally attenuate;  
 cheeks very short.  
 (69). 62. Mesonotum pilose and immaculate;  
 hind tibiae usually tricoloured.  
 (ITOPLECTIS, *Thoms.*)  
 (68). 63. Flagellum apically subincrassate;  
 terebra one-third length of abdo-  
 men.

- (67). 64. Abdomen not distinctly tuberculate nor mainly red.
- (66). 65. Mesonotum densely pubescent; abdomen laterally rufescent . . . 31. *MACULATOR*, *Fab.*
- (65). 66. Mesonotum shortly pilose; abdomen entirely black . . . 32. *ALTERNANS*, *Grav.*
- (64). 67. Abdomen strongly tuberculate and often mainly red . . . 33. *EPEIRAE*, *Bignell.*
- (63). 68. Flagellum apically subclavate; terebra not longer than 1st segment . . 34. *CURTICAUDA*, *Kriech.*
- (62). 69. Mesonotum subglabrous and usually flavous-marked; hind tibiae not tricolored (*APECHTIS*, *Thoms.*)
- (71). 70. Basal segment more deeply canaliculate; flavous marks sparse . . . 35. *BRASSICARIAE*, *Poda.*
- (70). 71. Basal segment less deeply canaliculate; flavous marks profuse . . 36. *RUFATA*, *Gmel.*
- (51). 72. Notauli distinct; frontal orbits always pale; tarsal claws of ♀ basally dentate (*TROMATORIA*, *Thoms.*)
- (78). 73. Thorax not ochraceous beneath; length six millimetres or more.
- (77). 74. Nervellus more postfurcal; mesothorax and scutellum red.
- (76). 75. Stigma testaceous; terebra not half length of abdomen . . . 37. *OCULATORIA*, *Fab.*
- (75). 76. Stigma piceous or black; terebra fully half length of abdomen . . 38. *ORNATA*, *Grav.*
- (74). 77. Nervellus less postfurcal; mesonotum and scutellum black . . . 39. *OVIVORA*, *Boh.*
- (73). 78. Thorax ochraceous beneath; length five millimetres . . . 40. *BRIDGMANI*, *Bignell.*

### 1. *roborator*, *Fab.*

*Ichneumon roborator*, *Fab.* E. S. ii. 170. *Cryptus roborator*, *Fab.* *Piez.* 116. *Pimpla roborator*, *Gr.* I. E. iii. 173; *Ratz.* *Ichn.* d. *Forst.* iii. 103; *Tasch.* *Zeits. Ges. Nat.* 1863, pp. 55 et 263; *Thoms.* O. E. viii. 753 et xix. 2126, ♂ ♀; *Holmgr.* Sv. Ak. *Handl.* 1860, n. 10, p. 25; *Voll.* *Pinac.* pl. xxi, fig. 5, ♂. *P. cicatricosa*, *Ratz.* *Ichn.* d. *Forst.* ii. 89, ♀; *cf. lib. cit.* iii. 96 et *Tasch.* *Zeits. Ges. Nat.* 1863, p. 265. *P. blattifera*, *Opusq.* *Mém. Soc. Belg.* 1896, p. 310, ♀; *sec.* *Schm. Zool. Jahrb.* 1888, p. 483, et *Opusc. Ich.* 1063.

A black, strongly pubescent and distinctly punctate species, with abdominal tubercles and elongate terebra. Head hardly narrowed behind the oblong and very slightly emarginate eyes; vertex somewhat broad; clypeus apically depressed and emarginate; palpi testaceous and labrum usually badius; frontal and internal orbits immaculate. Antennae filiform, not apically and hardly basally attenuate, longer than half body and often apically ferrugineous. Thorax gibbous, narrower than the head, longer than high, very distinctly but not closely punctate, shining and pubescent; metathorax sparsely but not strongly punctate with no distinct areae though the areola region is smoother with the petiolar and supra-coxal very smooth and spiracles subcircular. Scutellum black, in ♂ rarely apically piceous. Abdomen very strongly and distinctly punctate, fusiform and a little constricted towards base and apex, as broad as

and nearly double the length of the head and thorax, discally subdeplanate; black, or rarely with the central segments badius or castaneous with only their apices black; segments transversely impressed and laterally tuberculate with their apices broadly elevated and nitidulous; the first moderately elevated and shorter than the hind coxae; the following quadrate or in ♀ transverse; terebra as long or very nearly as long as the body, setulose, with the spicula smooth and badius. Legs somewhat slender, fulvous-red; anterior coxae castaneous or nigrescent beneath; tarsi apically infusate; front femora and tibiae flavescent below; occasionally the apices of all the femora and the tibiae before their base flavescent; hind tibiae apically and before the base indeterminately infusate; tarsal claws very distinctly lobate basally, their apical joint rather longer than double the penultimate. Wings somewhat clouded and not narrow; stigma nigrescent and sometimes basally paler; radix and tegulae pale stramineous; areolet irregularly subsessile, radius externally subsinuate at base and apex; nervellus postfurcal and intercepting in or just above the centre. Length, 11—13 mm.

This large species bears a superficial resemblance to *Ephialtes tuberculatus* and, like it, has the spicula apically subdeflexed; but the transverse second segment, ovate hind coxae, fusiform ♂ abdomen, and usually partly flavescent hind tibiae will distinguish it. The metathorax is distinctly margined apically and deeply foveate on either side; the development of the areola is variable, though usually obsolete, it is very obvious on one or two of my females.

This species, though occurring from Sweden to Italy from June to October, is nowhere common, especially in northern Europe. Ratzeburg records it from *Tortrix turionana*; and says that Reissig bred it in Darmstadt, with his *P. Reissigii*, out of alders in which *Cryptorhynchus lapathi* was burrowing—"with the female sent to me was also the cocoon" (its own or that of the beetle?) "from which it had emerged. It is seven lines long, quite smooth inside, covered outside with scraps of alder-wood" (cf. Trans. Ent. Soc. 1907, p. 53); he adds later that Brischke also bred it from *Sesia formicaeformis* early in June, as is noted, together with *S. sphecoformis*, by the latter (Schr. Nat. Ges. Danz. 1880, p. 112). Taschenberg's record of it from *Myelophila cribrella* must I think, be regarded with some little doubt, since in every other instance it has preyed upon xylophagous species. In Britain, for instance, it is apparently confined to *Sesia myopaeformis*, since Sich has given me a female taken on the trunk of an apple tree at Chiswick, in June, 1899, which was infested with the larvae of this moth; and Sparke captured another in his garden in the Tooting Bec Road, London, in the act of inserting its spicula into a hole in the bark of a pear tree, probably in order to reach the same species. It is, however, not common in Britain and the only records I can find, since its introduction by Marshall in 1870, are Bridgman's from Norwich and Harwood's for Essex in the Vict. Hist. of that county. It does not appear to have been noticed as a beneficial garden insect by any of the economists, though to the best of our present knowledge it most frequently occurs in such situations, sometimes at lime blossom, as was discovered by Platten in Ipswich on 7th July, 1900. I have once taken the female on flowers in the Bentley woods on 29th August, 1895. Dours says of *Nematus interceus*, Oliv., "Sa larve qui vit dans les galles du saule Marsault a pour parasites *Pimpla reborator*, Grav.," etc. (cf. *P. gallicola*, post.)

2. *ruficollis*, Grav.

*Pimpla ruficollis*, Gr. I. E. iii. 153; Tasch. Zeits. Ges. Nat. 1863, pp. 57 et 264; Schm. Zool. Jahrb. 1888, p. 494, ♀. (?) *P. variegata*, Ratz. Ichn. d. Forst. i. 118 et ii. 95, ♂ ♀.

A dull, closely punctate and mainly red female, with elongate terebra. Head black and not narrowed behind the eyes; face centrally subelevated longitudinally, finely and not very closely punctate with sparse pilosity; frons and vertex not uneven, distinctly and somewhat closely punctate with short grey hairs and no central canaliculation; palpi dull stramineous, clypeus badius. Antennae shorter than the body, black, pilose, filiform throughout with the joints not elongate; flagellar joints cylindrical and not apically clavate, second and third subequal and one-fourth shorter than the basal. Thorax gibbulous, discally deplanate; prothorax black and shining with sparse white hairs; the dull, closely punctate and shortly pilose mesonotum and mesopleurae, with sometimes a mark on the metapleurae, red or castaneous; notauli distinct and subconfluent discally; metathorax strongly and rugosely punctate and elongately pilose with very faint traces of the areola basally; petiolar region smoother, spiracles small and quite circular. Scutellum and postscutellum dull, closely punctate, red or castaneous, with a basal black dot before the former. Abdomen closely and subconfluently punctate with short white pubescence throughout, as broad as and double length of the thorax, slightly constricted towards base and apex; basal segment black, not longer than broad, laterally margined and scabrously punctate, basally excavate and carinate to centre, apical margin centrally elevated and red; segments apically smoother but not elevated, castaneous with their extreme apices black and their bases centrally infusate, the anus entirely red; terebra exactly as long as the body, black, thinly pilose, transaciculate with red spicula. Legs fulvous with the anterior trochanters stramineous; posterior tarsi, and sometimes also the hind tibiae externally and basally, infusate; claws small, black, simple and not basally lobate; hind onychii hardly thrice the length of the penultimate joint. Wings hyaline with the stigma entirely pale testaceous, radius infusate, radix and tegulae whitish; areolet irregular and subsessile; nervellus intercepting exactly in the centre. Length, 6—9 mm.

Gravenhorst says it is similar in conformation to *P. roborator*, but more slender with the terebra longer; it is certainly very like *P. pomorum*, though larger with the antennae and terebra longer, and the areola not glabrous.

Marshall followed Desvignes' synonymy of *P. variegata* with this species and it is very probably correct, although Schmiedeknecht queries its identity with *P. cercopithecus*, Costa, which appears to differ solely in its appendiculate and longer tarsal claws. This species was introduced as British by Desvignes (E.M.M. 1868, p. 174) on the strength of specimens now in the British Museum, reared by Barrett from *Tortrix buoliana*. Ratzburg bred his species from the same host, as well as from *Tortrix Nordlingiana* and *T. Mulsantiana*; and Giraud (Ann. Soc. Fr. 1877, p. 410) instances *Grapholitha tripunctana*, *Retinia Buoliana*, *Cynips terricola* and a species of *Andricus*. With us it is recorded from the Lands End district, by Marquand; as bred on 1st November from *Retinia resinana* and captured at Clearbrook, in Devon, by Bignell; Adkin bred two females from *Retinia pinivorana*, Zell., at Forres (Proc. S. Lond. Soc.

1896, p. 81); and Barrett from *Retinia turionana* (Entom. 1880, p. 68). I possess two females (above described) of variable size, bred on 9th and 12th July, 1903, together with a male of the Ophionid *Cremastus interruptor*, Grav., on 23rd, from *Retinia buoliana*, Schiff., in the buds of pine at Corfe Castle, in Dorset, and kindly given to me by Mr. E. R. Banks. Beaumont took it at Courten, in Ireland, early in September, 1893.

### 3. *graminellae*, *Holmgr.*

*Pimpla graminellae*, Gr. I. E. iii. 181, excl. ♂ ♀ et varr. 2, 3, 4 (*nec* Schr. et Ratz.); Holmgr. Sv. Ak. Handl. 1854, p. 88 et *lib. cit.* 1860, n. 10, p. 22; Tasch. Zeits. Ges. Nat. 1863, pp. 59 et 266; Brisch. Schr. Nat. Ges. Danz. 1864, p. 112; Thoms. O. E. viii. 752 et xiii. 141, ♂ ♀. *P. stercorator*, Fab. Piez. 117; Gr. I. E. iii. 186, excl. ♀. *P. Holmgreni*, Schm. Zool. Jahrb. 1888, p. 502 et Opusc. Ichn. 1088, ♂ ♀.

Head black, in ♀ with the palpi infusate and apex of clypeus more or less ferrugineous, in ♂ with the palpi, clypeus and face entirely flavous; clypeus depressed and, more especially in ♀, apically distinctly emarginate; face somewhat closely punctate centrally; orbits immaculate. Antennae filiform, slightly longer than half the body, testaceous and darker above with the basal joints entirely black; of ♂ fulvescent with the scape entirely flavous beneath. Thorax black with only a badious callosity before the radix; metathorax diffusely rugose and nitidulous, with lateral longitudinal costae distinct; areola obsolete but laterally strongly costate and apically confluent with the somewhat smooth but not centrally carinate petiolar area; spiracles circular. Scutellum black. Abdomen entirely black, strongly constricted at base and apex, densely punctate with strong lateral tubercles and the apices of the segments broadly elevated and subnitidulous; basal segment a little longer than broad, slightly narrowed and deeply excavate basally with the carinae somewhat distinct; second strongly punctate, apically somewhat smooth and obliquely deeply impressed on either side at the base; third to fifth strongly punctate, laterally tuberculate and apically subglabrous; hypopygium retracted and emarginate; seventh ♂ segment subtransverse; terebra about half the length of the abdomen. Legs somewhat stout, red with the front coxae mainly black basally; tibiae paler, the hind ones dull stramineous and broadly infusate at apex and before base; hind tarsi also dull stramineous with apices of their joints black; hind coxae coarsely, shallowly and granulately punctate beneath; tarsal claws of ♀ basally lobate; ♂ with the anterior legs mainly, front coxae usually entirely, flavescent and the hind tibiae and tarsi whitish, causing the infusate bands to appear more distinct than in ♀. Wings normal, flavescent; stigma infusate and basally indistinctly pale; radix and tegulae piceous; nervellus very strongly postfurcal, intercepting far above the centre. Length, 8—12 mm.

This species is entirely distinguished by the rugose underside of the hind coxae and the height above the centre at which the nervellus intercepts.

I certainly consider Schmiedeknecht has but added to the cumbrous synonymy of this species by erecting a new name for it: priority provides that a species shall be known by the oldest name under which it was recognizably described. Schrank's description is inadequate, Gravenhorst's is too involved with distinct species to be intelligible, Ratzeburg's refers to an entirely different and already described species, consequently

*Pimpla graminellae* of Holmgren must, in my opinion, stand, since neither the *P. stercorator* of Fabricius' later work nor of Gravenhorst's ♂ are sufficiently lucid to take priority. The earlier authors, to Giraud in 1863, confused it mainly with *P. detrita*, Holmgr.

From all others of the difficult group to which this species belongs, it may easily be distinguished by combining the two determinate dark bands of the testaceous ♀ or white ♂ hind tibiae, the short terebra, dark stigma, shining metathorax, granulate hind coxae and position of the nervellus; the face, but not the frontal orbits, of ♂ are flavous.

This species is widely distributed but uncommon throughout Europe, though not rare in Scandinavia. In central Germany, where Taschenberg has bred it somewhat doubtfully from *Tortrix viridana* and (a ? larva of) *Cosmia diffinis*, it is rare and appears twice a year, in May when the males are attracted to young beech foliage and again later; in Belgium it is also somewhat rare, occurring in July and August. Giraud records it as bred in France from *Grapholitha Servillana*; he adds in a footnote that a variety emerged from larvae of *Olindia ulmana* collected on ash trees at Hyères in May (cf. Ann. Soc. Fr. 1877, p. 409).

Lands End (Marquand); Bolts Head and Bickleigh, in the middle of June (Bignell), also at Ivybridge, in Devon (S. Edwards); bred by Gardner from *Orygia antiqua* (Buckler); common in Norfolk and bred by Cross from *Plusia festucae* (Bridgman); on hawthorn leaves near Huddersfield in 1880 (Bairstow); near Carlisle, bred from *Depressaria heracleana* in 1900 (Day); Pettycur, in the middle of June (Evans); on hemlock in July in Wigtonshire (Gordon); near Birmingham in September (Martineau); Hastings (Butterfield); St. Leonards and Essex (Vict. Hist.); both sexes bred from pupa of *Odonestis potatoaria* (Proc. S. Lond. Soc. 1896, p. 85). Probably all the above British records are incorrect; Bridgman's, upon which most reliance can be placed, certainly refers to some other species: I cannot think that a "common" Norfolk species can be represented in Suffolk by four specimens as the result of thirteen years collecting! The only specimens upon which I can rely are two females and a male taken by Capron about Shere, a male by Piffard at Felden, in Herts., another by Thornley at Mablethorpe, in Lincs. and one female, with three males taken in Suffolk by myself. The female was vivaciously investigating a thistle-stem (*Onopordon acanthium*), covered with *Aphis cardui*, Linn., on the bank of the river Gipping at Great Blakenham, on 24th June, 1899; of the males, one was captured in the Bentley Woods at the end of July, 1894; one swept from *Artemisia* by the river Orwell at Wherstead early in August, 1904; and the third found on Angelica flower at Eye, at the end of August, 1900. It has also been recorded from *Odonestis potatoaria* (Entom. 1880, p. 68), *Ephippiphora scutulana* or *E. pflugiana* (l.c. 1884, p. 68) and *Clostera reclusa* (l.c. p. 71). My record (E.M.M. 1900, p. 42) refers to *P. maculator*, Fab.

#### 4. *Hibernica*, sp.n.

Head black with the palpi testaceous, and the clypeus of ♂ ferrugineous; clypeus depressed and apically distinctly emarginate; the immaculate face closely and very obsoletely punctate throughout; orbits immaculate. Antennae filiform, distinctly longer than half the body, testaceous and darker above with the basal joints in both sexes entirely black. Thorax black with no pale callosity before the radix; metathorax evenly and somewhat

strongly though not very closely punctate, with the lateral longitudinal costae distinct; areola laterally very strongly costate, apically explanate and confluent with the smooth but centrally distinctly carinate petiolar region; spiracles circular. Scutellum black. Abdomen black with the central segments nearly always subcutaneously badious, strongly constricted at base and apex, densely punctate with strong lateral tubercles and the apices of the segments broadly elevated and subnitidulous; basal segment not longer than broad, slightly narrowed and deeply excavate basally with the carinae indistinct and not extending to the centre; the second strongly punctate, apically glabrous and obliquely deeply impressed on either side at the base; third to fifth strongly punctate, laterally tuberculate and apically subglabrous; terebra less than half the length of the abdomen (abdomen  $4\frac{1}{4}$ , terebra  $1\frac{3}{4}$  mm.). Legs not very stout, red with all the coxae black, those of ♂ usually with the apices of the anterior rufescent; tibiae not paler, the hind ones together with their tarsi exactly concolorous, with only the apex of the former and of their tarsal joints determinately black; hind coxae distinctly and somewhat strongly punctate beneath; tarsal claws of ♀ basally lobate. Wings normal, somewhat infumate; stigma infusate and basally indistinctly paler; radix and tegulae piceous; nervellus very strongly postfurcal but intercepting only slightly above the centre. Length, 6—8 mm.

This species is strongly allied to *P. graminellae* in its punctate coxae, the entire conformation of the thorax and abdomen and in the strongly postfurcal nervellus, but is very distinct in its shorter basal segment, carinate petiolar area, the almost centrally intercepted nervellus and in the shorter petiolar carinae, besides the superficial distinctions of the differently coloured legs, ♂ face and scape.

I have drawn the above description from four males and two females captured by the late Mr. Alfred Beaumont at Kilmore, in Ireland, between the 11th and 23rd August, 1898, and from one female taken by Colonel Yerbury at Kenmare, in Co. Kerry, on 30th June, 1901 (mentioned by me, E.M.M. 1902, p. 55). The types are in my collection.

### 5. *rufipleura*, Bignell.

*Pimpla rufipleura*, Bignell, Trans. Ent. Soc. 1889, p. 15; Young Naturalist, 1890, p. 96, ♂ ♀.

Head smooth and shining; internal orbits, clypeus, base of mandibles, palpi and in ♂ whole face, "pinkish." Antennae longer than half body; ♂ with flagellum and scape "pinkish" beneath. Thorax smooth and shining, sparsely and superficially punctate; "a pinkish dash on the scutellum and metanotum, and a line before the wings"; pleurae rufescent. Abdomen about twice length of head and thorax, subcylindrical; segments subquadrate and coarsely punctate with their apical margins somewhat broad, smooth and glabrous; terebra one-third the length of the abdomen. "Legs, tricolor; middle and hind coxae, trochanters and femora ferrugineous; front coxae, much lighter; hind femora, the extreme apex whitish, a black dot on the upper side at the base; front and middle tibiae and tarsi ferrugineous; middle tarsi at the extreme apex, fuscous; hind tibiae, base and middle, whitish; a ring near the base, and the entire apex, black; tarsi whitish; extreme apex of joints, black". Nervellus intercepting in the centre. Length, 7—8 mm.

The figures of both sexes closely resemble *P. didyma*, as also do the economy and the Bombycid host; but the present species is smaller, more nitidulous with the abdomen in both sexes parallel-sided with the mesopleura broadly rufescent. It is very remarkably like *P. ovivora*, Boh., and if I had had an opportunity of examining the types before drawing up my table of species, I should certainly have placed it next that insect, under *Tromalobia*.

"Twenty-three males and females of this unique species were bred 10th April, 1888, from a batch of cocoons kindly sent to me by Dr. T. A. Chapman, who obtained them from a larva of *Pygaera curtula*. This batch of cocoons were so like a cluster of *Macrocentrus* cocoons that Mr. Bridgman at first sight could scarcely credit they were those of a *Pimpla*, which, as a rule, are solitary parasites; but fortunately one male died within its cocoon, which I desired Mr. Bridgman to remove to make certain that I was correct in my observations, which he did, and he is now able to vouch, if necessary, for the accuracy of my statement." (Bignell, *loc. cit.*) Of these Mr. Bignell has allowed me to examine the one female and two male co-types in his collection; specimens were sent to Bridgman and are presumably still in the Norwich Museum; the remainder became neglected and are destroyed. He has also presented me with a pair of this species bred at New York from a spider, *A. riparia*; and a single male bred on 25th April, 1888, in South Carolina, from a spider's egg-bag.

## 6. *inquisitor*, Scop.

*Ichneumon inquisitor*, Scop. Ent. Car. n. 754, pl. xli, fig. 745. *I. visitor*, Scop. l.c. n. 750 (?). *I. stercorator*, Fab. E. S. ii. 172. *Pimpla pennator*, Fab. Piez. 171, ♀ (?). *P. stercorator*, Gr. I. E. iii. 186, excl. ♂; Boie, Krøy. Tids. 1840, p. 322; Ratz. Ichn. d. Forst. i. 115; ii. 90; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 23; Tasch. Zeits. Ges. Nat. 1863, pp. 58 et 268; Thoms. O. E. viii. 754 et xiii. 1414, ♂ ♀; Voll. Pinac. pl. ix, fig. 9, ♀. *P. flavipes*, Gr. I. E. iii. 197; Ratz. Ichn. d. Forst. i. 115; Holmgr. Sv. Ak. Handl. 1854, p. 88, ♂. *P. inquisitor*, Schm. Zool. Jahrb. 1888, p. 520, ♂ ♀.

Head transverse and a little narrowed behind the internally slightly emarginate eyes; face smooth, shining and almost impunctate; clypeus moderately emarginate and strongly depressed apically; palpi of ♀ infusate, of ♂ stramineous; frontal orbits immaculate. Antennae filiform and hardly attenuate apically, distinctly longer than half the body, black with the flagellum pale testaceous beneath, becoming apically darker; ♂ with scape flavous beneath. Thorax black, stout and nitidulous; a callosity before the radix stramineous; mesonotum shining, shallowly and diffusely rugose-punctate; pleurae finely and diffusely punctate throughout; metathorax basally coarsely punctate on either side; areola obsoletely costate laterally and incomplete apically; spiracles circular. Scutellum black. Abdomen dull, densely and coarsely punctate black, of ♀ subfusiform-cylindrical, as broad as and nearly double length of the thorax, constricted at base and apex; of ♂ cylindrical, as broad as and nearly double length of the thorax; basal segment quadrate, a little elevated with distinct and sharp carinae extending nearly to the apex; segments two to five strongly punctate, apically elevated and nitidulous, laterally subobsoletely tuberculate and in ♂ the second almost longer than broad; terebra about length of abdomen, elongately pilose, sometimes whitish and apically fulvous; genital valvulae of ♂ incrassate,



with the hypopygium short and retracted. Legs normal, red, in ♂ paler with the claws nigrescent; the anterior with the tibiae paler and the front coxae in ♀ basally more or less nigrescent; hind tibiae whitish testaceous with the apex and a band before the base infuscate, their tarsi nigrescent with the first three or four joints basally whitish; apical tarsal joint twice length of penultimate; claws of ♀ curved, acute and basally distinctly lobate. Wings normal, more or less flavescent in ♀, and hyaline in ♂; stigma always pale testaceous, radix and tegulae stramineous; areolet irregular, subsessile or subpetiolate, sometimes obliquely transverse; radial nervure somewhat curved apically; nervellus intercepting in the centre. Length, 10—12 mm.

The ♀ is similar to *P. graminellae*, but the terebra is distinctly longer and the coxae simple. It is also like *P. brevicornis*, but the colour is not quite the same, the antennae in both sexes are distinctly longer than half the body (my ♀ is 10 mm. and its antennae nearly 7 mm.), the abdomen is more strongly cylindrical, its lateral tubercles more obsolete, the carinae of the basal segment more prominent and the nervellus nearly central; moreover the abdomen is more uneven with the segments less closely and regularly punctate. It differs from *P. calobata*, Grav., in having the pleurae lightly punctate throughout, especially in the furrow before the suture, in its finely transaciculate petiolar region, black abdomen and nominally shorter terebra, which is of the same length as the abdomen.

This is the species hitherto known in Britain as *P. stercorator*, but it has recently been found (*cf.* Rogenhofer and Dalla Torre, in the Verh. z.-b. Ges. 1881, p. 597) to have been described by Scopoli, in 1763, under the name here adopted.

Throughout Europe this species is said to be nowhere uncommon from May to September. It has been frequently, though sometimes uncertainly, bred by Ratzeburg, who tells us (*l.c.*) that Bouché raised it from *Orgyia antiqua* (*cf.* Naturg. 146), as well as from 9 mm. parasitic cocoons on *Bombyx salicis*; in August, from pupae of *Bombyx neustria* upon several occasions; and Reissig bred a small variety of 5 mm. out of *Tinea abietella*. Brischke (*l.c.* iii. 96) also bred it from the pupae of *Gastropacha polatoria* and, on 18th April, from *Tortrix prasinana*; *Tinea cognatella* is another nearly certain host. The male form, *flavipes*, was also bred by him from *Lithosia quadra* and *Gastropacha neustria*; on 22nd June from *Tortrix viridana* and *T. laevigana*; Wissmann bred from *Anobium striatum*, along with *Hemiteles modestus* (*cf.* Tr. Ent. Soc. 1907, p. 19), a somewhat doubtful male of this *Pimpla*; and possibly Ratzeburg's *P. longiventris*, described from an immature ♂, found in a hazel leaf rolled by *Apoderus coryli*, is synonymous with this species, of which males were bred from the same host by Reissig; it was further obtained in masses from *Curculio betuleti* in rolled aspen leaves, in the middle of July; and bred from *Tortrix resinana*, *T. Edmanniana* and *T. immundana*. To the above varied hosts, Taschenberg adds *Meloides cribrella*, *Larentia varatrata*, and *Sciaphila pennsylvanica*; he adds that the sexes have been captured *in cop.* On Brischke's authority, we find it preying upon *Psilura monacha* and *Nephopharyx vacciniella*; he also (Schr. Nat. Ges. Danz. 1864, p. 112) shortly describes the parasite's cocoon. In France, Giraud raised it from *Grapholitha tripunctana* and *Nematus salicis*.

As far as Britain is concerned, this species is a mystery to me: I find it in every local list without exception and this, from its Continental frequency, seems natural enough; I can only suppose that I have been

unfortunate in securing examples of it, for I possess but a single female that I can conscientiously refer to it: this I owe to the generosity of Miss Chawner, who has sent me so many valuable New Forest Ichneumonidae, including the present female. We have Gravenhorst's assurance that Hope took it about Netley, in Shropshire; and Bignell bred it once in South Devon from a larva of *Eupithecia linariata* feeding on the unripe seeds of toadflax, on 14th March. It is recorded from Essex, Hasting and Fairlight (Vict. Hist.); York (Yorks. Nat. 1881, p. 153); Lands End district (Marquand); Earlham, near Norwich, and bred by W. Fletcher from *Eupaccilia flavicilliana* (Bridgman); both sexes bred from larvae of *Phycis betulae*, by South (Proc. S. Lond. Soc. 1896, p. 86); and Thornley has, I believe, found it at Mablethorpe, in Lincs., and Tresswell, in Notts. Dours (Cat. Hym. France), on Goureau's authority says *P. stercorator* is parasitic on the larva of a sawfly, *Cephus compressus*, Lep.

A most curious instance of predatory habits is brought forward by E. W. Lewis (Mag. Nat. Hist. 1833, p. 414) in connection with an insect, which Westwood perhaps a little arbitrarily refers to the present species (Mod. Class. ii. 150). His "Transactions of a Fly with a Long Tail" recount it as frequenting lilac bushes in search of the caterpillar of a small moth which rolls up the leaves of those shrubs to form a shelter for itself from the inclemency of the weather and the attacks of its enemies. This, however, is insufficient to protect it from its ingenious assailant, the long-tailed fly, which thrusts its ovipositor into the leafy habitation and speedily drives the larva from its concealment. But, strangely enough, oviposition is not the object of this piece of intelligence; the ichneumon at once pounces on the larva, disables it by a puncture of the ovipositor and then proceeds to devour the carcase. In this way the fly proceeds most unmercifully, destroying many more caterpillars than she can eat. One might guess the larva to be that of *Gracillaria syringella*; but the whole statement is too bizarre to be received without later corroboration and, as Westwood (*l.c.*) says "From the circumstance that these insects in the perfect state are not ordinarily observed preying upon other insects, it may be inferred that the accounts recorded in the old authors of their voracious propensities, applied to some species of Sphegidae rather than of Ichneumonidae." However, like Dallas in his record of the above remarkable history (Elements, 244), "I am not aware that this very exceptional habit has been noticed by any other observer; and in this respect, as in many others, there is still much to be discovered in the oeconomy of this remarkable tribe of Hymenoptera."

### 7. *similis*, Bridg.

*Pimpla similis*, Bridg. Trans. Ent. Soc. 1884, p. 433, ♂ ♀; Schm. Rev. Pimp. 1897, p. 591 et Opusc. Ichn. 1095, ♀.

A black species with red legs, not very broad abdomen, elongate terebra and no metanotal punctures. Head entirely black, hardly narrowed behind the very slightly emarginate eyes; face pilose and centrally elevated; frons not centrally canaliculate between the unusually large scrobes; four apical palpal joints of ♀ piceous and of ♂ clear stramineous. Antennae exactly two-thirds the length of the body, black and becoming ferrugineous beneath towards their apices. Thorax immaculate, metanotum glabrous and nitidulous; areola indicated but hardly costate, not narrow and a little explanate towards the transversely subaciculate petiolar region;

metapleurae distinctly and not finely punctate with short and dense griseous pilosity; notauli anteriorly distinct; spiracles circular. Scutellum black. Abdomen black, more parallel-sided than in *P. brevicornis* and less conspicuously tuberculate; basal segment of ♀ not longer than apically broad, coarsely punctate, smoother centrally with the carinae almost wanting; (abdomen 5, terebra  $4\frac{3}{4}$  mm.). Legs clear fulvous with the front coxae and apices of all the onychii alone black; hind tibiae and tarsi of ♂ dull testaceous, with the apex and a cloud before the base of the former indeterminately infuscate, and the basal joint of the latter broadly white; apical hind tarsal joint less than four times the length of the penultimate and longer than the third; claws of ♀ broadly and obtusely lobate at base. Wings not at all clouded; stigma infuscate with the base clear stramineous; areolet somewhat large; nervellus intercepting exactly in the centre. Length, 9 mm.

Bridgman (*loc. cit.*) says the size and shape are extremely like those of *P. brevicornis*, but that the thorax is "entirely free from sculpture," the abdomen a little more strongly punctate and the colour of the legs is distinct. In his MS. table of the genus he differentiates them by the stigmal colour, places the present species next *P. sagax*, from which it differs in its coxal colouration, and points out many characters for both sexes, which have enabled me, with the aid of Swedish examples, to draw up the above description.

This species has never before been adequately described and the Continental authors consider the nervellus to be intercepted below the centre and the ♂ unbekannt, though Bridgman distinctly says in describing it that both sexes were bred by Mr. W. H. B. Fletcher from *Ephippiphora scutulana*. I have seen but two British examples of this species, which is only recorded from Earham and Brundall, near Norwich; Donisthorpe took a ♀ at Rossbeigh, in Co. Kerry in June, 1902, and Adams another at Lyndhurst early in July. But A. Roman has been so good as to send me both sexes, bred from two red-brown, stout and somewhat smooth cocoons of disproportionate size, spun upon each other and presumably of their own construction, whence the insects had emerged through a jagged, irregular hole near the extremity. The cocoons were found in dry stems of *Anthriscus sylvestris* at Upsala, where they emerged on 28th April and 1st May. This is the first time *P. similis* has been noticed on the Continent.

### 8. robusta, sp.n.

Head immaculate black, clypeus apically emarginate. Antennae a little longer than half the body (body 11, antennae 6, mm.). Thorax entirely black with no pale callosity before the radix; metanotum with the lateral areae wanting, centrally always flatly bicarinate, and basally distinctly and sparsely punctate on either side; spiracles circular. Scutellum black. Abdomen stout and fusiform, distinctly punctate and tuberculate, less than double length of head and thorax (former 7, latter 4, mm.); terebra a little longer than half the abdomen (abdomen 7, terebra 4, mm.). Legs pure sanguineous red with only the front coxae, all the basally lobate claws, and sometimes the extreme apices of the hind tarsal joints, black; tibiae always immaculate; apical hind tarsal joint not at all explanate, thrice length of the penultimate and distinctly longer than the third; hind coxae subglabrous. Wings always somewhat deeply flavescent; stigma

piceous, with its base obscurely testaceous; nervellus opposite and intercepting exactly in the centre. Length, 9-11 mm. ♀ only.

There appears to me to be some confusion on the Continent among *P. detrita*, *P. sagax* and the present species, which does not quite correspond with any described by Schm. This is a large insect always of between nine and eleven millimetres, with both the thorax and abdomen stout and subfusiform; the wings always somewhat strongly yellow; the hind tibiae and usually their tarsi immaculate red, with the onychii not at all dilated. *P. detrita* (to which M. A. Roman, of the Stockholm Museum, would refer *P. robusta*) is described by Holmgren as being similar to, with the abdomen subcylindrical and in conformation resembling, *P. angens*; with a total length of from three to four lines only; the wings simply a little infumate; the hind tibiae apically and before the base, and the apices of their tarsal joints always, infusate and the onychii a little dilated. All these points of the latter agree perfectly with my *P. detrita*, which (I am told) is known abroad as *P. sagax*, Htg.; but the latter, of which I only know the ♂, has the front tibiae very strongly arcuate and not, as Thomson very truly says of *P. detrita*, "♂ tibiis anticis fere rectis descendens" (O. E. 754). The present species is most closely related to *P. similis* and the piceous-stigma form of *P. brevicornis*. The ♂ is probably not uncommon, but mixed among those of *P. brevicornis*; I do not know it.

This is by no means an uncommon species with us; it first occurs on the flowers of *Heracleum sphondylium*, in the south of England as early as 26th June, and extends on those of *Angelica sylvestris* till 26th September; it is also found on *Cnicus palustris* flowers and by sweeping reeds, nearly always in marshy places. I have found it at Foxhall, Barnby Broad, Southwold, Henstead and Monks' Soham, in Suffolk; Matley Bog, in the New Forest and Ningwood, in the Isle of Wight; and have received it from Lyndhurst (Adams), Finborough Park and Tostock (Tuck), Lewisham (Beaumont), Greenings (W. Saunders) and Shere (Capron), Lynmouth and Horfield, near Bristol (Charbonnier), Felden (Piffard) and Ripley (Bedwell). Upon one or two occasions I have noticed it investigating the *Angelica* seeds, as is noted under *P. detrita*.

### 9. *Taschenbergi*, D.-T.

*Pimpla nigriceps*, Tasch. Zeits. Ges. Nat. 1863, p. 266; Schm. Zool. Jahrb. 1888, p. 505, ♀ (nec Brullé). *P. Taschenbergi*, Dalla-Torre, Cat. Hym. iii. 451; Schm. Opusc. Ichn. 1084, ♀.

Flavivous red. Head entirely black; face with white pilosity. Antennae brunneous. Thorax red, with a line before the radix flavivous and some of the sutures black; areae incomplete, spiracles circular. Abdomen red with the terebra black and hardly longer than half the abdomen. Legs red; hind ones with the base of the femora, the apex and a mark before the base of the tibiae, and the apices of the tarsal joints, obsoletely infusate; apical tarsal joint hardly thrice length of penultimate, claws basally lobate. Stigma, radix and tegulae flavivous; nervellus distinct and intercepting hardly below the centre. Length, 11½ mm.

The ♂ is still unknown, and the ♀ has not been found since it was described by Taschenberg from Halle, in Saxony. I consider it extremely probable that this ♀ is entirely synonymous with *P. diluta*, Ratz., which its author did not know and from which it appears to differ solely in the

rather darker flagellum and basally infusate hind femora, if the relative length of the tarsal joints be overlooked.

At first it appeared to me that Bridgman had mistaken *P. pomorum* for the present species, which he records as new to Britain (Trans. Ent. Soc. 1886, p. 366), as captured by Thouless at Drayton, in 1885. This specimen, he says, agrees with Taschenberg's *P. nigriceps* in general colouration and structure (i.e. such little as that author—and subsequent ones—mentions!), but its length was only five millimetres. He did not recognise *P. pomorum* as British till 1889, when Capron sent him it from Surrey; but in his Ichneumons of Norfolk, in 1893, he records *P. pomorum* taken at Drayton by Thouless, and entirely omits *P. nigriceps*: strongly pointing to the assumption that the latter name was incorrect. But in bringing forward *P. nigriceps*, he had said that the nervellus intercepted "a little below the middle," whereas in *P. pomorum* it intercepts close to the posterior nervure. In his specimen, he adds, that the sternum and metathorax were black (as in *P. pomorum*). I have seen nothing like it.

#### 10. *diluta*, Ratz.

*Pimpla diluta*, Ratz. Ichn. d. Forst. iii. 102; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 28; Schm. Zool. Jahrb. 1888, p. 528; Opusc. Ichn. 1068, ♀; Bridg. Entom. 1879, p. 55, ♂; Trans. Ent. Soc. 1881, p. 166, ♂ ♀. ? *P. laevigata*, Tschek, Verh. z.-b. Ges. 1868, p. 273, ♂ ♀.

A somewhat large, bright fulvous species. Head black and not narrowed behind the somewhat emarginate eyes; frons and vertex finely and closely punctate with grey pilosity, the former not centrally canaliculate; face immaculate and, more densely in ♂, clothed with long grey hairs. Antennae bright fulvous, hardly longer than half the body, filiform in ♀ and in ♂ hardly more attenuate apically; scape and sometimes basal half of the first flagellar joint black. Thorax somewhat stout, bright fulvous with the sternum, scutellar region, extreme base and apex of metathorax, mesonotum laterally and, more usually in ♂, discally black; elongate line before the radix flavous; metathorax somewhat irregularly, and in ♂ obsoletely, punctate with grey pilosity; areola basally subparallel-sided and often nigrescent, apically explanate; petiolar area smooth and apically margined; spiracles small and quite circular. Scutellum finely punctate, pilose, dull and, together with the postscutellum, fulvous. Abdomen bright fulvous: of ♀ elongate-fusiform with the extreme apices of the segments sometimes darker, subelevated and nitidulous; otherwise strongly punctate and transversely impressed at their apical third, before which the central ones are laterally subtuberculate; basal segment strongly and convergently bicarinate to a little beyond the subinfusate centre only; terebra half length of abdomen, black, strongly transverse-aciculate and setigerous, with the spicula black: of ♂ bright, fulvous, cylindrical, sublinear, more than double the length of the head and thorax, glabrous and nitidulous, becoming, as in ♀, subpilose apically; segments obsoletely impressed transversely at their apical third, tubercles wanting; extreme apical angles of the second and the apex of the seventh segment to anus black; basal segment double length of breadth and the second nearly so, former finely and distinctly bicarinate to near the constricted apex. Legs entirely fulvous with only the claws black; hind tibiae hardly darker at apex and before base; onychii explanate and four times longer than the penultimate joint; claws of ♀ distinctly, of ♂ obsoletely, lobate

basally. Wings flavescens with stigma fulvous or flavidous; radix and tegulae flavous; areolet transverse, not broad, with the outer nervure mainly pellucid; nervellus subopposite and intercepting in or only very slightly below the centre. Length, 9-11 mm.

That the above ♂ is synonymous with *Theronia laevigata* I can hardly credit, since the metathoracic spiracles of that species are described as oval; in any case it is very closely allied. Bridgman's description has hitherto been overlooked on the Continent, where the ♂ is still unknown. He says that "it would almost appear that the ♂ is a *Theronia* and the ♀ a *Pimpla*, thus uniting the two genera. I thought at one time it might be a variety of *Theronia*, but such is not the case. Mr. E. A. Fitch kindly sent me a *Theronia* from Kaltenbach's collection, and they are very different: in the hind wing of *Theronia* the transverse anal nervure is placed behind the brachial fork, and divided distinctly above the middle, whilst the ♂ and ♀ of *P. diluta* have it opposite the brachial fork and divided almost in the middle or a trifle below." Schmiedeknecht says that Gravenhorst described the present species among his varieties of *P. graminellae*, but this can hardly be the case since all of them have the sixth segment black.

Bridgman first took it in 1877, introduced it as British in 1879, and says in June he took two or three females at Brundall, near Norwich, and within three or four yards of the same spot the above described males; I possess a specimen of each sex given by him to Dr. Capron. Ratzeburg originally bred it from *Tortrix resinana* in Germany and in Britain Barrett has bred it from *Pyrameis cardui* (Entom. 1880, p. 68 et 1881, p. 141). It is certainly a very rare species with us and I have seen, besides the above, but two females, which were beaten from yew trees in a fir wood at Bentley on 20th March, 1903, by Mr. Ernest Elliott and myself; I had worked the same wood for ten years and never seen it before.

### 11. *melanocephala*, Grav.

*Pimpla melanocephala*, Gr. I. E. iii. 149; Tasch. Zeits. Ges. Nat. 1863, pp. 56 et 264, ♀; Schm. O. I. 1067, ♂ ♀. *P. bicolor*, Boie, Stett. Zeit. 1855, p. 102; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 27, ♀.

A slender and badius species, with large abdomen and dilated tarsi. Head black, short, transverse, finely punctate, shining and not narrowed behind the internally deeply emarginate eyes; frons unequally impressed, clypeus subdepressed and apically truncate; palpi stramineous or testaceous, face in both sexes immaculate. Antennae filiform, longer than half the body, pale ferrugineous with the apices of the flagellar joints and whole scape black; scape externally deeply excised. Thorax stout, gibbous with the metathorax fulvidous; pleurae punctulate; metanotum with the areola distinct though apically incomplete, and spiracles circular. Scutellum black with the postscutellum fulvidous. Abdomen as broad as and double length of the thorax, of ♀ subcylindrical or oblong-fusiform and a little constricted towards base and apex, of ♂ subparallel-sided; fulvous with the segments apically elevated; second to fifth laterally transversely impressed, uneven and coarsely punctate; basal segment distinctly carinate, of ♂ not double length of breadth; terebra black, one quarter length of abdomen with the valvulae shortly pilose. Legs normal, fulvous with the posterior tarsi apically black, their claws distinctly dentate basally, and the apical tarsal joint in both sexes fully four times longer

than the penultimate. Wings normal, subhyaline with the stigma and radius nigrescent, the radix and tegulae red or testaceous; areolet triangular, irregular, sessile; nervellus antefurcal and intercepting in the centre. Length, 9-13 mm.

The form *bicolor* differed somewhat from the original description of this species in having the size larger with the metathorax and front coxae black.

To the above description of authors I will add that in my two-dozen specimens the eyes are hardly at all emarginate next the scrobes, the head is a little broader behind them and vertically subquadrate in the ♂, the frons in both sexes is longitudinally canaliculate in the centre and sub-elevated below the ocelli, the mesonotum is alutaceously and finely punctate with the notauli deeply impressed; the metathorax deeply and sparsely punctate with rufo-griseous pilosity and its often glabrous areola, basally parallel-sided, is confluent with and expands apically into the petiolar area, which is glabrous and nitidulous; the basal segment is subrugosely punctate and distinctly bordered laterally with basally strongly elevated carinae, which converge and are apically distinct and parallel; the following segments are deeply and distinctly punctate throughout, with their apices smoother, transversely impressed at their apical third, before which the three central segments are laterally variably tuberculate; the terebra is reflexed, strongly setigerous and one fifth of the length of the abdomen; the tarsal claws are acuminate and apically nearly straight, basally sharply dentate; the apical tarsal joint is dilated, four times as long as the penultimate with elongate pulvilli; the areolet is transverse and not broad with the outer nervure, especially in the ♂, mainly pellucid; stigma nigrescent-piceous with its base and the metacarpus at its apex pale, nervellus only a little antefurcal and intercepting in ♀ slightly and in ♂ somewhat distinctly below the centre. The colouration is more extreme in the ♂, which varies from having the body entirely black to the abdomen clear flavous with only the two apical segments black; that of the ♀, which I have found the rarer sex, is more or less badius throughout and paler centrally; the metathorax is never clear fulvous, often black and occasionally badius; the coxae are more often black or nigrescent, though usually badius and rarely clear red throughout. The narrow head and thorax, and elongate and dilated onychii are, however, most distinctive. The size of my specimens ranges from  $5\frac{1}{2}$ -11 mm.

I possess one ♀ which I do not care to describe as of more than varietal importance—var. *deplanata*, nov. This has the notauli much less deeply impressed, the frons less uneven, its abdomen somewhat less convex, much more sparsely and somewhat more deeply punctate, the metathorax apically less glabrous, the terebra slightly longer than half the abdomen and the claws shorter with the basal lobes less acute; abdomen badius. In its longer antennae and terebra it approaches *P. arundinator*, from which the relative length of the tarsal joint distinguishes it.

This species is widely distributed on the Continent, though not recorded from Belgium and nowhere of common occurrence. It is evidently a marsh species, since it has been bred by Boie (*l.c.*) from *Leucania obsolcta*, and several were swept from reeds on the margin of a lake by Boheman and Holmgren in Sweden. I can find no indigenous records since Desvignes introduced it as British on the strength of specimens in Curtis' collection. It is probably extremely local with us and only occurring in primeval marshes. I swept four males and one female from reeds in

Chippenham Fen, in Cambs., on 16th June, 1899; and one female from reeds long after dark in Herringswell Fen, in Suffolk, on 21st August, 1905; but in the latter locality on 4th July, 1903, it was very abundant on reeds in the afternoon, and I swept 13 males and 6 females. One female, named *P. detrita* by Bridgman and recorded as such by Big-nell (Trans. Devon. Assoc. 1898, p. 502), was bred by the latter in Devon, on 30th June, 1883, from *Chilo phragmitellus*, which occurs at Tuddenham Fen, within a mile or so of Herringswell, but I have never taken *P. melanocephala* there during my frequent visits; nor have I found it in the Lowestoft Broad, where *L. obsoleta* occurs. The var. *deplanata* I swept from rank herbage in a very boggy part of Surlingham Marsh, in the Norfolk Broad, on 10th June, 1901.

## 12. *arundinator*, Fab.

*Pimpla arundinator*, Fab. Piez. 116; Gr. I.E. iii. 177; Tasch. Zeits. Ges. Nat. 1863, pp. 59 et 265; Brisch. Schr. Nat. Ges. Danz. 1864, p. 113; Schm. Zool. Jahrb. 1888, p. 500, ♀; Opusc. Ichn. 1045, ♂ et 1078, ♀; ? Holmgr. Sv. Ak. Handl. 1860, n. 10, ♀. *P. interruptecalloso*, Stöbl. Mitt. Nat. St. 1901, p. 14, ♀.

A black species with badius abomen, entirely red legs and explanate onychii. Head black with the palpi and apices of clypeus stramineous; all the orbits immaculate. Antennae basally nigrescent, centrally infusate-ferrugineous and apically paler. Thorax immaculate; metathorax elongate with the areola laterally parallel and distinctly costate; of ♀ dull and rugose, basally with scattered punctures and apically finely transverse-rugose; of ♂ diffusely punctate; spiracles circular. Scutellum black. Abdomen of ♀ nearly double length of head and thorax, oblong and a little broader than the latter, variable in colour, rarely entirely black, with the segments always apically black and elevated; of ♂ not very coarsely punctate; basal segment bicarinate, black, apically subexcavate and sometimes castaneous; second to fifth castaneous or dull ferrugineous; fifth sometimes infusate, the following black throughout; terebra half the length of the abdomen, spicula badius, valvulae black and pilose. Legs quite unicolorous, fulvous-red, with at most the extreme apices of the hind tibiae subinfusate; front femora not emarginate beneath; apical hind tarsal joint fully double length of the penultimate; tarsal claws of ♀ distinctly lobate. Wings somewhat clouded, with the stigma dull piceous or rarely dull testaceous and basally paler; radix and tegulae stramineous; areolet irregular, subpetiolate; nervellus slightly postfurcal, intercepting hardly above the centre. Length, 7—11 mm.

I consider it extremely improbable that the species described by Holmgren under this name is synonymous with that of Gravenhorst: he says of the "nervellus distincte supra medium fractus," whereas Taschenberg says of the latter "in der Mitte oder meist deutlich darunter gebrochen"; the former also says the hind tibiae are nigrescent before their base, but he himself was uncertain of its synonymy and gave it as differing from his *P. variabilis* in its narrower body, immaculate vertical orbits, longer terebra, more incomplete metanotal areae and entirely rufescent posterior coxae.

This species is noted in MS. as undoubtedly the ♀ of *Colpomeria (Ephialtes) inanis*, Grav., by Marshall in his Catalogue, but certainly incorrectly, since its male is referred to, though very meagrely, by Schmied-



eknecht who, curiously enough, does not notice it in his subsequent detailed description: perhaps he gives it hyperthetically.

In puncturation, colour and sculpture it is remarkably like *P. melanocephala* and it is also curious that two so closely allied species should prey, as far as is at present known, exclusively upon insects inhabiting the common reed, though the difference between a Lepidopterous and Dipterous diet can hardly account for the obvious abbreviation of the penultimate tarsal joint of the latter species, which will at once distinguish it from *P. arundinator*.

This species, originally recorded from among reeds in Austria, appears widely distributed though uncommon in central and northern Europe. It is said to occur in Belgium in July and August; Dr. Giraud has bred it in the isles of the Danube, near Vienna, from both *Lipara lucens* and *L. tomentosa*, in the stems of *Arundo phragmites*;<sup>\*</sup> and there is a black female bred from the former host in the Strassburg Museum. It was brought forward as British in Marshall's 1870 Catalogue, but no one has recorded the species here since that time, though it is by no means uncommon in marshy places on reeds, etc., from the middle of May to the middle of June. Tuck has found it at Tostock, Thornley at Mablethorpe in Lincs. and South Leverton, in Notts., Capron at Shere and it has several times occurred to me in the spring: in a marshy pit at Gallows Hill near Needham, at Harleston, in the Bramford marshes and Barnby Broad, as well as in August in Tuddenham Fen and Chippenham Fen, on the flowers of Angelica. Morey has found it in Parkhurst Forest, in the Isle of Wight, in early August.

### 13. didyma, Grav.

*Pimpla didyma*, Gr. I.E. iii. 178; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 24; Tasch. Zeits. Ges. Nat. 1863, pp. 58 et 267, ♀; Ratz. Ichn. d. Forst. i. 114; Schm. Zool. Jahrb. 1888, p. 518, ♂ ♀.

A black and tuberculate species, with elongate terebra and pale-marked face. Head somewhat narrowed behind the large and internally slightly emarginate eyes; frons glabrous and impressed on either side above the scrobes; face smooth and pubescent with shallow and diffuse puncturation, of ♀ centrally impressed, of ♂ entirely flavous; cheeks very short, in ♂ subobsolete; palpi and mandibles except apex of the latter in ♀ fulvous, in ♂ flavous as is the clypeus; labrum pale; face of ♀ with two sometimes confluent flavous marks beneath the scrobes; all the orbits immaculate. Antennae distinctly stout, subfiliform and hardly longer than the head and thorax in both sexes, infusate throughout or basally ferrugineous beneath; scape apically not deeply excised and in ♂ entirely flavous beneath. Thorax black with a callosity before the radix, and in ♂ the base of the

<sup>\*</sup> Mémoire sur les Insectes qui vivent sur le Roseau commun (*Phragmites communis*, Trin., *Arundo phragmites*, L.)" Verh. Wien. z.-b. Ver. 1863, pp. 1251—1288. Also cf. Ann. Soc. Fr. 1877, p. 408.

In this valuable article, which systematists appear to have almost entirely ignored and I have only had an opportunity of examining after the above was in type, Dr. Giraud says that of 20 ♀ examined only two had the abdomen at all red, as indicated by Grav. He adds that it is very like that of "*P. graminellae*, Grav." (certainly really *P. detrita* from his note, at l.c. p. 1291, that the ♂ front femora are excavate: he did not know Holmgren's work on the genus). He points out that the discal carinae of the basal segment are strong, whereas in the latter they are but feebly indicated. This distinction holds good in both sexes, of which he considers *Ephialtes inanis*, Gr., to be its male. Certainly the male he bred frequently with *P. arundinator*, ♀, is correctly referred to *P. inanis* (q.v.), but it is more convenient to at present follow Thomson and Brischke in this respect. Giraud says it is a frequent parasite of *L. tomentosa*, Mcq., about Vienna and emerges at the same time as its host, whose galls on reeds it perforates a little below the apex. Its larva lives solitarily in the body of that of the Dipterous and undergoes its metamorphoses in the latter's pupa.

propleurae throughout, stramineous; notauli short but distinct; mesonotum subglabrous, closely and very finely punctate; metanotum with large, sparse punctures and scanty, grey hairs; areola smooth, centrally concave and laterally weakly costate; petiolar area very smooth and nitidulous; spiracles circular. Scutellum black, sparsely and shallowly punctate. Abdomen oblong-subfusiform, coarsely punctate and somewhat strongly contracted at base and apex in both sexes; basal segment hardly longer than broad, strongly punctate, a little elevated and in ♀ with somewhat distinct carinae reaching nearly to its apex; second to fifth strongly punctate and tuberculate, apically broadly smooth and distinctly elevated; terebra exactly as long as the abdomen or only four-fifths of its length, with valvulae setigerous and spicula castaneous. Legs fulvous and distinctly stoutish; the anterior of ♀ slightly and of ♂ obviously paler with the front coxae and trochanters entirely, and most of the intermediate, at least in ♂, stramineous; hind legs with the tarsi of ♀, and apices only of the ♀ testaceous and ♂ white tibiae, black; tarsi of ♂ entirely stramineous with only apices of the hind ones infusate; claws of ♀ distinctly lobate basally; hind coxae not granulate, their apical tarsal joint hardly thrice longer than the penultimate. Wings subhyaline; stigma and radius always nigrescent, tegulae and radix stramineous; areolet irregular, broadly triangular and subpetiolate; nervellus intercepting exactly in or slightly below the centre. Length, 7—9 mm.

The ♀ is instantly known from all other species of this genus by the colour of the face and the ♂ as readily by the basally flavous propleurae; the tibiae in all the British specimens I have seen are always apically but never before their base infusate, though the basal colour appears more variable on the Continent, where this species attains a size of from ten to ten and a quarter millimetres; it resembles *P. graminellae*, but the terebra is longer, the hind coxae not granulate, the face of the ♀ and pleurae of the ♂ are pale-marked and the hind tibiae are not basally infusate. I have given a somewhat detailed description since the ♂ has hitherto been but poorly described by Ratzeburg and hardly more than mentioned by Brischke.

This species, which is rare everywhere in northern and central Europe, has been recorded from Sickershausen, Piedmont, Thuringia, Ljungby in Sweden, in August and September in Belgium and from France. Ratzeburg says Hartig instances it (Jahresb. p. 253) as attacking Kiefern-spinners (*Bombyx pini*) in Germany. With us, though recorded as British in 1856, it has since been mentioned only by Bridgman as "common" in Norfolk and by Bignell as captured by Parfitt in Devon, by sweeping in June. I have never received it from my numerous correspondents and, except in one instance, the female alone has occurred to me singly: by sweeping reeds at Bramford at the end of June, 1895; by sweeping herbage at Barham at the beginning of September, 1896; on Angelica flower in Finborough Park at the end of August, 1900; and, out of Suffolk, I have met with it once on Angelica flower in Matley Bog, in the New Forest, towards the end of August, 1901, and once by sweeping a hedge-row at Burnham Thorpe, in Norfolk, towards the end of August, 1906. I possess a single male captured by Capron about Shere. Twelve females and ten males of this species were bred on 26th July, 1897, from a single cocoon of *Odonestis potatoria*, found at Ipswich. The disposition of the parasites' brown, externally rough and internally smooth but not shining, cocoons of twelve millimetres in length is similar to that of *Spillocryptus*

*cimbicis*, being woven upon one another in a more or less solid mass, and the external conformation of each varies with the space allotted by those surrounding it; the imago escapes through a somewhat regularly circular hole, entirely excised, near the apex. Besides those which succeeded in emerging were several which failed to attain maturity; some died in the larval condition and are now flat, dry, shrivelled, chocolate-brown with about thirteen strongly transverse segments and a small, lighter, round, smooth head showing darker mandibles. In one cocoon containing a defunct larva is the remains of a skin, pointing to the conclusion that the larva casts its skin for another larval one after completing its cocoon. Others died as pupae, with the legs drawn close to the body, the antennae folded forward on the sternum, the terebra reflexed over the dorsum of the abdomen and the basal segment not, as is usual in ichneumonidous nymphs, pressed closely upon the metathorax. Unfortunately I kept no record of the total number, but I still possess twenty-six of the parasites upon the single caterpillar; its prolificness and the ubiquity of its present host argue rather retiring habits in the imago than genuine rarity.

#### 14. *brevicornis*, Grav.

*Pimpla brevicornis*, Gr. I.E. iii. 211; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 24; Tasch. Zeits. Ges. Nat. 1863, pp. 60 et 268; Thoms. O.E. viii. 755 et xiii. 1414; Schm. Zool. Jahrb. 1888, p. 522, ♂ ♀. *P. laticeps*, Ratz. Ichn. d. Forst. ii. 94, (sic) ♂.

A shining, uneven black species with legs mainly red and terebra as long as abdomen. Head transverse, shining, smooth and hardly narrowed behind the eyes, viewed from in front rotund-triangular with the cheeks short; vertex broad, face diffusely and coarsely punctate; palpi testaceous, head immaculate. Antennae filiform, somewhat stout and neither apically attenuate nor longer than half the body, generally ferrugineous apically beneath, but not pale basally; ♂ with scape in typical form immaculate. Thorax gibbulous, shining with a flavidous callosity before the radix; mesonotum sub-rotund, finely rugose-punctate with notauli somewhat distinct; metathorax feebly and diffusely punctate; areola smooth, laterally finely costate and apically incomplete; spiracles circular. Scutellum black. Abdomen shining, black, nearly double length of head and thorax, deeply, very closely and evenly punctate, and finely pubescent; of ♂ cylindrical sublinear and as broad as thorax, of ♀ fusiform-cylindrical and somewhat explanate centrally and hardly broader than the thorax; basal segment moderately elevated and apically alutaceo-punctate on either side, of ♀ subquadrate, almost shorter than the hind coxae and distinctly bicarinate; second to sixth segments strongly punctate, apically broadly smooth, shining and elevated, laterally distinctly tuberculate; terebra hardly as long as abdomen, or in typical form longer (abdomen  $3\frac{3}{4}$ , terebra  $4\frac{1}{4}$ —Tasch.), black with the valvulae setigerous. Legs somewhat short and not very slender, fulvous or testaceous with variable markings; typically:—coxae black with hind ones of ♀ sometimes partly red; trochanters black with the apices more or less broadly red; hind tibiae dull stramineous, apically and before the base and their tarsal claws, as well as often apices of the tarsal joints, infusate; apical tarsal joint subdiluted and two-and-a-half times longer than the penultimate; their claws in ♀ basally lobate. Wings moderately broad, distinctly flavescent, stigma stramineous (or piceous), radix and tegulae pale stramineous; areolet irregular, subsessile; radial nervure apically straight; nervellus subobso-

lete and intercepting distinctly below the centre. Length, 6—10 (typically  $6\frac{3}{4}$ ) mm.

Taschenberg says Gravenhorst's species was a mixture of several, and varied most certainly in the colour of the legs and stigma. Schmiedeknecht places little value upon the length of the terebra, which he says may be as long as or a little shorter than the abdomen; and it was originally described as longer than half, as long as or a little longer than the abdomen, the last form being taken as typical by Taschenberg in revising the types. In other respects it varies most in the pedal and stigmal colour, thus:

Var. 1, ♂ ♀. Hind tibiae white and distinctly binigrescent (var. 3, Gr.), sometimes with (var. 1, Holmgr.) all the coxae red, or also (var. *concolora*, Ratz.=*designatus*, Först.) the abdomen laterally rufescent.

Var. 2, ♂ ♀. Anterior legs white, ♂ scape flavous beneath (form typ., Thoms.=var. 2, Holmgr.=*invalidus*, Först.)

Var. 3, ♂ ♀. Hind tibiae entirely red (var. 2, Gr.), combined either with (a) infusate stigma (var. 3, Holmgr.=*viator*, Först.), when the ♀ sometimes also has all the trochanters red (var. 1, Gr.) or (b) with pale stramineous stigma and nervures, and the hind trochanters alone partly black (var. Brisch.=*propinquus*, Först.).

Var. 4, ♂ ♀. Femora more or less black, in ♂ sometimes nearly entirely so (var. 4, Holm.).

In all its forms, however, it may be recognised by having:—The antennae not longer than half the body, the nervellus intercepting below the centre, the basal segment laterally punctate and not unusually short, though transverse in both sexes, the head not unusually large, the metathorax sculptured, the terebra longer than two-thirds of abdomen and a pale callosity before the radix.

This species is like *P. inquisitor*, but the antennae are shorter, the abdominal tubercles are stronger and the position of the nervellus is distinct. Thomson says it differs from his *P. nigriscaposa* by the basal segment of the ♀ being hardly, and of the ♂ not, transverse and more obsoletely punctate; he considered the ♂ to have the scape beneath, and the palpi, constantly citrinous; than *P. stercorator* he says the antennae are shorter, the ♂ face more distinctly sericeous and its apical tarsal joint a little longer than the third. In Britain specimens with the stigma piceous are very uncommon and I have seen no ♂ ♂; I firmly believe it to be a distinct species though no structural distinction is traceable; the body is more parallel-sided, the terebra averages longer and the wings are usually more clouded.

The females of this species are very common everywhere throughout central and northern Europe, but the males are always uncommon; Ratzeburg mistook an imperfect female for his male in describing *P. laticeps*, which was bred from *Curculio notatus*. Holmgren's var. 2 was bred by Brischke from *Selandria bipunctata*, his var. 4 from *Microgaster congestus* and a *Gelechia* on *Statice*, his var. 3 from *Pissodes notatus* and *Retinia resinana*; this last is probably synonymous with *Scambus sagax*, Htg., preying upon *Anthonomus pomorum*, *Tortrix resinana*, *T. buoliana*, *T. cosmopherana*, *Tischeria complanella*, and *Conchylis posterana*, since Brischke's variety of the present species was also bred from the two last-named hosts, as well as from *Gymnaetron campanulae*, from which Giraud also raised var. 3, *Tortrix laevigana* and a *Laverna* on apple twigs.

With us this species is certainly common enough, though I am inclined to regard it as somewhat local, since it is found in marshy places both on the coast and inland, but is very rarely seen in woods; unlike the majority of Ichneumonidae, it is frequently met with in dull weather and by sweeping herbage after dusk. It has occurred to me, as it approximately does in Belgium, from 27th June to 28th September, never appearing to extend into October, and certainly commonest at the end of August, when it may be picked between finger and thumb from the flowers of *Angelica sylvestris* or swept from reeds; the flowers of *Heracleum* and *Aster tripolium* on the coast are also attractive to it. This refers to the females, for the males are very rare and I possess but some dozen of them to seventy of the opposite sex. The males are, as far as I am aware, found exclusively upon the flowers of wild carrot, *Angelica* and *Heracleum*, only from the end of July to that of August. This species has been several times bred in England and is recorded from *Eupithecia linariata* (Entom. 1880, p. 68), *Gelechia intaminatella*, *Coleophora melilotella* (l.c. 1881, p. 141), *Tortrix forsterana*, *Scricoris euphorbiana* (l.c. 1883, p. 67), from the pupa of a beetle (l.c. 1885, p. 152), and from *Leucophasia sinapis* (Ent. Ann. 1874, p. 125).

Bairstow says it has been captured at Acomb Wood, near York, Marquand in the Lands End district, Bridgman that it is common in Norfolk and bred from *Melanippe hastata* and *Eupacilia flaviciliata*, and Bignell took it at Bickleigh late in June and bred it, early in August from *Dianthaea cucubali*, in Devon. I have seen specimens captured at Humber Bank in Lincs, near Hull, by Mason; and at Peel by Cassal in the Isle of Man, whence it is also recorded by Walker (Entom. 1873, p. 432). Probably most, if not all, of my records under *P. graminellae* refer to this species. I possess specimens with pale stigma from Guestling, near Hastings (Bloomfield); Shere (Capron); Kilmore, in Ireland and Colwyn, in September (Beaumont); Selby in Yorks (Ash); both sexes from Whiting Bay, in the Isle of Arran (Waterston); Rookley Wilderness, in the Isle of Wight (Morey); abundant on leaves of *Populus tremula* at Galashiels, in September (Haggart); Bugbrook, in Northants (Marshall); Delamere Forest and Carlisle (Tomlin); Botusfleming, in Cornwall (Marshall); Llandrindol, in June; Barnby Broad and Eriswell, in Suffolk; and Chippenham Fen, in Cambs., in September (Elliott); Greenings and Wimbledon (W. Saunders); Tostock, Benacre Broad and Finborough Park, in Suffolk (Tuck); Egryn Lake, near Barmouth (W. Ellis); Wapley Hill, in Hereford (Yerbury); bred from some Lepidopteron at Lincoln (Musham); New Forest (Miss Chawner); Felden, in Herts (Piffard); Cookston, Ravenscraig, Gourrock and both sexes at Giffnock (Dalglish). I have found it in Suffolk at Barnby Broad, constantly at Foxhall and often abundantly on *Angelica* flowers in August, Eyc, Tuddenham Fen, Southwold occasionally in profusion on reeds in salt marshes in September; Reydon marshes, Easton Broad, Freston Woods, Aldeburgh and Bentley. Elsewhere it has occurred to me at Gosfield in Essex, Ringstead Downs near Hunstanton and in Matley Bog, in the New Forest, where it is not uncommonly to be seen gently hovering at flowers of *Cnicus palustris*, on which I noted were no *Aphides*. The form with dark stigma is very scarce; I have it from Surrey in Capron's collection, and have captured it on *Angelica* at Barnby Broad, Gosfield, Foxhall, Tuddenham Fen and Matley Bog. Chapman has bred two males, which I doubtfully refer to this species, at Cannes in April from *Luffia paucillimana*, in 1901.

15. *punctiventris*, *Thoms.*

*Pimpla punctiventris*, Thoms. O.E. viii. 756 et xiii. 1414, ♂ ♀.

Black. Head with the vertex somewhat broad and hardly narrowed behind the eyes; whole head, including all the orbits and ♂ face, immaculate; clypeus obviously depressed and emarginate apically. Scape black in both sexes. Metathoracic areae entirely wanting; spiracles circular. Abdomen of both sexes parallel-sided and of ♂ linear; sparsely and strongly punctate, sometimes infuscate-testaceous, with the apices of the segments always distinctly though narrowly nitidulous; basal segment transverse in both sexes, and strongly and closely punctate on either side; ♂ with the second segment subquadrate; terebra not shorter than the abdomen, spicula obliquely truncate at its apex. Legs red with the coxae, excepting sometimes the hind ones of the ♀, and the base of the trochanters, black; legs of ♂ more slender with the hind femora rarely infuscate and the front ones simple, not emarginate; ♀ with the claws basally lobate. Radial nervure slightly sinuate towards its apex; nervellus nearly antefurcal and not intercepted above the centre.

The ♀ of this species closely resembles *P. calobata*, but it is a little more slender with the abdomen more parallel-sided, the tubercles and segmental apices though sufficiently obvious are less elevated, and the basal segment is shorter with its sides very distinctly punctate. Both sexes have the basal segment not longer than broad and laterally punctate, the metathorax with hardly traceable carinae and the coxae black. The ♂ materially differs in its simple front femora.

This species, which Thomson described from Sweden and Continental authors have so confused with *P. calobata* as to render its range indistinguishable, is said by Bridgman (Trans. Norf. Soc. 1893, p. 630) to occur at Mousehold, near Norwich, though he makes no comment upon the fact that it is new to our fauna. If his records of its breeding by W. Fletcher from *Coleophora inflata*, *C. pititella*, *Laverna epilobiella*, *Euchromia flammicoma*, *Eupacilia atricapitana* and *E. flaviciliana* be correct, it cannot be of rare occurrence with us, but as I have stated, he did not know *P. calobata*, Grav. It appears to be abroad exclusively in the late summer: I have two females taken by the late Mr. Alfred Beaumont, at Plumstead, on 7th August, 1897, and five males taken by myself at Westleton, Beccles, Tuddenham Fen and Kessingland, in Suffolk, between 30th July and 29th September by sweeping, and on the flower-heads of *Daucus carota* and *Angelica*.

16. *pomorum*, *Ratz.*

*Pimpla pomorum*, Ratz. Ichn. d. Forst. ii. 96, ♂ ♀; cf. *lib. cit.* iii. 103 et Thoms. O.E. xix. 2127; Tasch. Zeits. Ges. Nat. 1863, p. 267; Schm. Zool. Jahrb. 1888, p. 506, ♀.

A small red species with only the head, part of thorax and apices of segments black. ♀. Head black and constricted behind the eyes; face short shining and distinctly punctate; palpi flavidous, orbits immaculate. Antennae infuscate and not longer than half the body, rufescent beneath with the scape paler. Thorax red with the prothorax, mesosternum, apex of the diffusely punctate pleurae and, except apical lateral marks, the metathorax black; metathorax short, convex, shallowly and diffusely punctate with the subobsolete areola slightly depressed and slightly shining, with the lateral costae wanting; spiracles circular. Scutellum and postscutel-

lum red. Abdomen uneven, densely and coarsely punctate with weak tubercles; basal segment black, not longer than apically broad, closely and coarsely punctate with the broad basal excavation entirely glabrous, nitidulous and laterally costate; the remaining segments red with their apices black and smooth though hardly elevated; terebra very nearly as long as the abdomen, black and pilose. Legs dull rufescent throughout, with the front ones paler; hind tibiae and tarsi pale testaceous, with the apices and an indeterminate band before the base of the former, and apices of the joints of the latter, infusate; hind coxae finely and evenly punctate and pilose; apical tarsal joint double length of the penultimate, claws basally lobate. Wings flavescient with the stigma, radix and tegulae stramineous; nervellus subobsolete and intercepting far below the centre. Length, 5—6 mm.

♂. Abundant as the ♀ is, we know nothing of the ♂ beyond Ratzeburg's surmise that "a 5 mm. ♂, which Dr. Nördlinger bred with *P. pomorum*, probably belongs to it. It agrees in sculpture, in the pale stigma, the white tegulae, radix and collar, as well as in the light colour of the legs, which have, as is usual in the males, rather more white; but the red colouration of the thorax is entirely wanting; the whole antennae are lighter, especially the two basal joints which are white beneath; and the abdomen is more or less infusate." Both sexes were again bred later by Reissig.

This species, which possibly constituted the type of Förster's genus *Tromera*, is superficially similar to *P. ruficollis*, but always smaller, with the nervellus subobsolete and intercepting much lower, the basal segment excavate to distinctly beyond its centre, and both the antennae and the terebra shorter. Thomson draws attention to its likeness to a small red *P. brevicornis*.

*P. pomorum* was described by Ratzeburg (*loc. cit.*) from specimens bred by Reissig from *Curculio pomorum* in pear blossom, and both sexes raised from the same host by Nördlinger; later (iii. 103) he adds that the former bred both sexes from apple blossom. I cannot find that it has been bred since that time. It is said to be rare in Thuringia and southern Sweden, and is not included in Tosquinet's very full list of the Belgian *Pimplae*, nor does Dours mention it from France. In Britain, on the contrary, the female is one of the commonest of all Ichneumonidae in the early spring and may be frequently beaten, with *P. maculator*, from Coniferae from 16th February to 9th April, though in general not quite so commonly as its congener. There are very few records, however, probably since it was not recorded as British till Bridgman brought it forward (Trans. Ent. Soc. 1889, p. 435) on the strength of specimens captured by Dr. Capron at Shere, in a spot where *Anthonomus pomorum* was abundant. Subsequently Marshall found it commonly at Cornworthy, in Devon; and Thouless at Drayton, in Norfolk. I possess, besides those taken by Capron, several from Felden in Herts., captured in the middle of February by Piffard, and at Tostock in Suffolk by Tuck; and have seen others from Kings Lynn in Atmore's collection. I have invariably beaten it from *Pinus sylvestris* and *Picea excelsa* in fir woods about Bentley in Suffolk in the spring, though once it occurred to me on a large *Taxus baccata* in my garden here at Monks' Soham, on 19th October. With us it certainly does not prey upon the Apple Weevil, since that species is entirely unknown in Suffolk, and its habitat at Bentley is not within a couple of miles of any orchard, though crab-apples occur in the woods.

17. *gallicola*, sp.n.

A small black species with red legs. Head black, transverse, shining, smooth, hardly narrowed behind the entire eyes and, seen from in front, broadly rotund-triangular; vertex somewhat broad and not separated from the glabrous frons by emarginations; palpi pale and all the orbits immaculate. Antennae ferrugineous, with the ♂ scape and pedicellus white, beneath. Thorax black, gibbulous, shining, with a bright stramineous callosity before the radix; mesonotum distinctly and finely pilose with anterior notauli; pleurae shining, distinctly and sparsely punctate and pilose; metanotum more distinctly and evenly punctate throughout with the sides of the areola distinct; petiolar region not transversely aciculate; spiracles circular. Scutellum black. Abdomen evenly and regularly but not confluent nor closely punctate, not tuberculate and hardly double length of head and thorax, badius with the base darker; apices of segments neither elevated nor nitidulous; basal segment of ♀ not longer than broad, laterally not punctate but shagreened with carinae not extending beyond the centre, of ♂ nearly half as long again as broad, with the sides shagreened and carinae reaching to its apex; all the ♀ segments transverse, ♂ with the second to fourth elongate and the fifth quadrate, ventral valvulae not exerted; terebra as long as abdomen, valvulae very stout with elongate pilosity, spicula flavescent and distinctly explanate before the acuminate apex. Legs clear fulvous; ♀ with the hind tibiae hardly infusate before the base and not at all at their apices, apical tarsal joint slightly darker and the claws basally lobate; ♂ with the coxae and the hind tibiae centrally stramineous, hind coxae above, their tibiae at apex and before base and the tarsal joints except basally, indeterminate brunneous; front femora not emarginate and tibiae straight. Wings not clouded; stigma luteous or pale testaceous, radix and tegulae stramineous; areolet transverse-triangular, emitting recurrent nervure from its apical third; nervellus intercepting far below centre and distinctly postfurcal. Length,  $4\frac{1}{2}$ —5 mm.

This species differs from *P. calobata* in its wanting abdominal tubercles and flat segmental apices, wherein it agrees with *P. nucum*. But from the latter it is at once distinguished by the much shorter ♀ second segment and the simple ♂ front femora. It most closely resembles *P. punctiventris* in the conformation of the ♂ femora, but the basal segment in neither sex is laterally punctate and the ♂ scape is white beneath.

The above description is drawn from one male and five females, which were kindly sent me by Miss Bray, who bred them at Hailsham, in Sussex, from the galls of *Pontania viminalis*, Htg., on long-leaved willow, in 1900 and 1901. It is noteworthy, in this group of slightly varying species, that all the females exactly agree *inter se*. The types are in my collection.

Peter Cameron gives (E.M.M. 1877, p. 200) some details, which appear to refer to this species, though he simply calls it *Pimpla* sp. and gives no reason for referring it to the genus at all. He says, "Two years ago I opened a young juicy gall of *Nematus viminalis*, and found inside of it a small parasitic larva, scarcely more than a line in length, and which, from its small size, I considered to be a Chalcid. Being desirous of watching its development, I carefully closed the gall again, bound it together with a thread, and placed it in an air-tight bottle; but before doing so, I examined with a lens the inside of the gall, and satisfied myself that this



larva was its only inmate; and I may further add that the saw-fly larvae in the galls on the same willow-bush from which the specimen in question was taken, were either in the egg or in the first moult. A day or two after closing the gall, I re-opened it and the larva then appeared to have increased in size; this struck me as rather singular and, my curiosity being awakened, I determined to watch its progress, so it was carefully returned to the bottle. In the course of five days it had become a pupa, and more than double the size of the larva when I first saw it, the pupa itself being smaller than the full-fed larva. From this observation it became clear to me that whatever the larva may have been before I noticed it, it was undoubtedly, when under my scrutiny, a vegetable-feeder, feeding on the juices of the gall, which I had managed always to keep fresh. The following year I endeavoured to repeat my observations, but without success, although I examined hundreds of galls. I did notice one curious fact: in one gall I found a saw-fly larva, about three-fourths fed, along with a parasitic larva; but an accident prevented my seeing the issue of this case of what might be termed commensalism."

# 18. *pictipes*, *Grav.*

*Pimpla pictipes*, Gr. I. E. iii. 198, ♂; Tschek, Verh. z.-b. Ges. 1871, p. 38, ♂ ♀. *P. graminellae*, Ratz. Ichn. d. Forst. ii. 91, ♀ (*nec.* Holmgr.). *P. Ratzeburgi*, Kriech. Ent. Nachr. 1887, p. 84.

Head black, hardly narrower than the thorax and scarcely constricted behind the eyes; clypeus slightly emarginate apically; face centrally elevated, finely and not densely punctate; frons subglabrous, nitidulous and centrally carinate between the scrobes; occiput canaliculate longitudinally; cheeks immaculate, ♂ with mandibles except at their apices, palpi and clypeus white, ♀ with clypeus and palpi rufescent. Antennae a little longer than head and thorax, twenty-two jointed and ferrugineous, with the ♂ scape white, beneath. Thorax subcylindrical, black with a callosity before the radix stramineous; mesonotum shining, anteriorly and laterally distinctly, centrally and basally more finely and diffusely, punctulate; mesopleurae finely and diffusely punctulate, metathorax nitidulous; metanotum basally subaciculate-punctate on either side with the areola sublinear, apically explanate and nearly obsolete; petiolar region and supracoxal areae glabrous and nitidulous; spiracles circular. Scutellum black. Abdomen linear-cylindrical, narrower than and double length of thorax, strongly and scabrously punctate; basal segment little longer than the hind coxae, centrally elevated and bicarinate to its apex; second a little longer than broad, two following quadrate; central segments distinctly tuberculate laterally and, especially basally, coarsely and confluent punctate, apically smooth, shining and elevated; terebra two-thirds the length of the abdomen, with the valvulae setigerous. Legs somewhat slender; the anterior of ♂ whitish-flavous with the femora fulvous above and the claws black, of ♀ with coxae and femora fulvous, trochanters and apices of femora and whole of tibiae flavescent, the last apically and a dot before base infusate; hind coxae fulvous and basally black, trochanters whitish flavous, femora fulvous with their apices infusate, tibiae whitish or in ♀ stramineous, with their apices and a dot before the base nigrescent, tarsi nigrescent with the first joint basally white; claws of ♀ basally lobate. Wings ample and hyaline; stigma piceous, radix and tegulae pale stramineous; areolet very small and transverse, of ♂ subpetiolate, of ♀

shortly petiolate; nervellus intercepting below the centre. Length,  $7.9\frac{3}{4}$  mm.

Gravenhorst says the male is similar in size and outline to his *Ephialtes inanis*, but with the abdomen more strongly tuberculate, the segments shorter and the front tibiae not arcuate. Tschek, who very fully described this species, points out that the ♀ is remarkable for its large wings and distinctly tuberculate abdomen, but indicates no line of demarkation from its allies.

This species occurs uncommonly in Germany, where Reissig has bred it from *Tinea populella* in rolled aspen leaves and from *Tortrix viridana* (Ratz. lib. cit.), Austria and in September in Belgium. It was introduced as British by Marshall in his 1870 Catalogus; but there is not a single extant record of its more exact occurrence with us, nor have I seen any indigenous examples.

### 19. *sagax*, Htg.

*Scambus sagax*, Htg. Jahresb. 1838, p. 267, ♂ ♀. *Pimpla sagax*, Ratz. Ichn. d. Forst. i. 117 et ii. 94; Thoms. O. E. xix. 2126; cf. lib. cit. viii., 754 et Brisch. Schnr. Nat. Ges. Danz. 1880, p. 113; Schm. Opusc. Ichn. 1102, ♂ ♀.

Head immaculate and hardly broader than the thorax, of ♂ with the vertex broad and the palpi white. Antennae hardly longer than half the body, infusate; of ♀ with the scape and pedicellus either partly or wholly white beneath, or with only the apex of the former dull testaceous. Thorax black and shining with the radical callosities, at least in ♂, white; metanotum very finely punctate basally, with the areae subobsolete; areola distinct, apically incomplete and narrow throughout; spiracles circular. Scutellum black. Abdomen narrow, strongly punctate, entirely black, of ♀ somewhat distinctly tuberculate with the apices of the segments elevated and nitidulous but not broadly glabrous, of ♂ linear with the basal segments longer than broad; first segment of ♀ quadrate, of ♂ hardly half as long again as broad, in both sexes laterally punctate and centrally strongly bicarinate to near its apex; terebra fully as long as the abdomen. Legs red, with all the coxae and base of the trochanters black; hind femora, at least apically, infusate; hind tibiae and tarsi nigrescent, both basally and the former centrally testaceous; ♂ with all the tibiae whitish, the front ones strongly arcuate, and their femora broadly emarginate beneath; apical tarsal joint double length of the penultimate, claws of ♀ basally lobate. Wings clear, with the stigma nigrescent and not narrow; nervellus of ♀ oblique and intercepting distinctly below the centre, of ♂ nearly opposite and intercepting in the centre. Length, 3.7 mm.

The ♂ has the body linear with the second segment longer than broad, and is at once known from every other species of the genus, excepting *P. ventricosa*, by its very strongly arcuate front tibiae, combined with the emarginate femora. The ♀ is very distinct from *P. detrita* in its elongate terebra, and nigrescent hind femora and coxae; it is said to somewhat resemble *P. brevicornis* but to be altogether a smaller and more slender insect approaching *P. calobata* in outline; I do not, however, know it and it appears to be somewhat ill-defined; Thomson places it near *P. detrita* with the intimation that the terebra is shorter than half the abdomen; Ratzeburg, on the other hand, says that in one of his examples the body was three, and the borer two-and-a-half, lines in length.

*S. sagax* was originally bred by Hartig from *Tortrix Buoliana*, and subsequently several times from *T. resinana* and *T. cosmophorana* in May, April and at the end of March; Brischke also records it from *Tischeria complanella*, *Conchylis posterana* and *Anthonomus pomorum*. Its Continental range appears to be restricted to Germany, Prussia and Sweden, whence I have received both sexes from Upsala. Bridgman records it (Trans. Norf. Soc. 1893, p. 630), with no note of its novelty as British, from Kings Lynn, in Norfolk, where it was bred from *Retinia turionana* by Atmore. I possess six of these small males, whose arcuate front tibiae render them unmistakable (though I quite think that more than one species is mixed under this character, for the length of the basal abdominal segments though all longer than broad varies considerably, as also does the colour of the scape and hind femora). They were all captured in the spring, between the 4th May and 12th June by beating spruce at Elveden, birch at Assington Thicks, and sweeping in Tuddenham Fen in Suffolk; on May-blossom at Burwell in Cambs.; and at Gosfield in Essex. One emerged at 9 p.m. on 26th April, 1907, from a quantity of dried heads of *Centaurea nigra*, gathered at the end of the preceeding March beneath fir-trees in my garden at Monks' Soham. It lived till 29th, but hid secretively among the débris and did not come up to the gauze, covering the breeding-jar, as did the numerous male *Bracon minutator*, bred from 21st to 24th April, and both sexes of a *Pteromalus*, bred from 2nd to 23rd May. Its host was undoubtedly *Urophora solstitialis*, many of which emerged during the following June: unless, of course, its presence there were purely accidental and its true association were with the overhanging conifers, in which case it would surely have shown itself in the jar in the course of the preceeding month. Mr. Bankes has given me six other males all bred together between 19th and 28th April, 1896, from the larvae of *Lithocolletis corylifoliella*, H.S., var. *caledoniella*, Stn., at Hesleden Dene, in Durham. I have seen two males in Bignell's collection, from Liverpool and bred from larva of *Lithocolletis trifasciella* found in Cann Wood, near Plymouth, in the middle of October.

## 20. calobata, Grav.

*Pimpla calobata*, Gr. I. E. iii. 176; Tasch. Zeits. Ges. Nat. 1863, p. 267, ♀; ? Ratz. Ichn. d. Forst. iii. 104, ♂ ♀. *P. nucum*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 25, ♀ (nec Ratz.). *P. punctiventris*, Thoms. Ö.E. viii. 756 et xiii. 1414, ♂ ♀. ? *P. Buolianae*, Ratz. Ichn. d. Forst. i. 114 et *P. planata*, l.c. 117.

♀. Head black, transverse, shining, smooth, hardly narrowed behind the eyes and, seen from in front, rotund-triangular; vertex somewhat broad and separated from the impressed frons by two emarginations; palpi stramineous, all the orbits immaculate. Antennae dull stramineous or ferrugineous beneath. Thorax black, gibbulous, shining, with a stramineous callosity before the radix; pleurae subglabrous and not at all punctate in the furrow before the suture; metanotum more distinctly punctate, unequally impressed with no areae, but with two longitudinal costae; petiolar region not transversely aciculate; spiracles circular. Scutellum black. Abdomen uneven, strongly but not very closely, confluenty nor regularly punctate, tuberculate, double length of head and thorax and as broad as the latter, badius or more or less rufescent; basal segment black and bicarinate almost to apex with the intervening space glabrous; the second longer and broader than the following, which are apically elevated,

smooth, shining, black with the second sometimes basally infusate; terebra black and a little shorter than the body (abdomen 7 mm., terebra nearly 8 mm.—Tasch.), with the valvulae setigerous. Legs normal, flavous-red; tibiae apically and before the base subinfusate, with the hind ones dull fulvescent beneath and centrally as well as at the base whitish above; hind coxae red, their tarsi infusate with the joints basally whitish; onychii double length of the penultimate joint, claws basally lobate. Wings at least basally flavescent; stigma stramineous; radix and tegulae whitish; areolet irregular, subsessile; radial nervure slightly curved towards the apex; nervellus intercepting very slightly below the centre. Length,  $4\frac{1}{2}$ — $10\frac{3}{4}$  mm.

Gravenhorst says this female is intermediate in conformation between *P. roborator* and *P. didyma*; Holmgren gives two varieties, one with the coxae infusate and the hind tarsi mainly testaceous and the other with the hind legs entirely red.

This species appears to me to be sufficiently distinct from *P. nucum*, Ratz., in its uneven, strongly punctate abdomen, the elevated and distinctly nitidulous apices of the segments and in the always more or less flavescent wings.

It is very closely allied to *P. punctiventris*, from which the distinctly bicarinate metanotum will distinguish both sexes and the emarginate femora the ♂; to my new *P. gallicola*, which differs in the wanting carinae of the postpetiole; and the more I study each author who mentions "*P. calobata*, Grav.," the more am I convinced that it is a most compound species, including under a single name very numerous quite distinct forms of Hartig's genus *Scambus*. No doubt can remain that Schmiedeknecht was in error in here including *P. punctiventris*, whose ♂ has simple front femora; and most probably *P. buolianae*, *planata*, *brunnea*, *cingulata*, *cingulatella* and, perhaps, *P. longiventris* would prove to be perfectly good and distinct species if the types could but be compared *inter se*. For my own part, I consider *P. calobata* to be a small species of five-and-a-half to seven millimetres, with the abdominal tubercles and segmental apices somewhat distinctly elevated, the terebra at least three-quarters the length of the abdomen, the basal segment laterally almost glabrous with the central carinae extending far beyond its centre, the metathorax bicarinate and the ♂ front femora distinctly emarginate.

No authentic details of this much confused species are recorded; it has long stood in our catalogues, but it has not hitherto been at all understood in Britain, as is evidenced by the number of hosts given by Bridgman for *P. punctiventris* and in the Entom. for *P. nucum*; probably all the latter are referable to the present species. The only published record I can find is that of Parfitt, who professes to have found it in Devonshire in June and July; his specimens are in the Exeter Museum. It has occurred to me infrequently and at long intervals: I beat a male from pine in Bentley Woods early in May, 1895; Tuck sent me a female from Aldeburgh in September, 1899; I took it at Southwold in July, 1901; another at the same time at Gosfield in Essex, in 1902; two in Tuddenham Fen, early in June; and one by sweeping after dark, in Herringwell Fen, in August, 1905. I possess examples taken from the Deal sandhills by Sladen, at St. Issey in Cornwall by Davies, at Nunton in Wilts and the Isle of Wight by Marshall, at Shere by Capron, at Cadney in Lincs. by Thornley, and at Crookston in Scotland in June, by Dalglish. That the male and female are correctly associated I have abundant proof from Banks, who has given me both sexes (referred to at Ichn. Brit. ii. 134)

bred together, and with *Hemiteles areator*, from *Coleophora ardeapennella*, Scott, at Bexley in Kent, in July, 1898. I have a male of this species, captured by Beaumont at Blackheath, near London, in August, 1897, and named *Pimpla brunnea*, Brischke, by Professor Brauns; it appears to me to differ from typical *P. calobata* in nothing but its paler abdomen, certainly the femoral emargination is identical.

## 21. *nucum*, Ratz.

*Pimpla nucum*, Katz. Ichn. d. Forst. i. 115, ♀; Tschek, Verh. z.-b. Ges. 1868, p. 446, ♂ ♀; Voll. Pinac. pl. xxi, fig. 9, ♂ (*nec* Holmgr.). *P. calobata*, Schm. Zool. Jahrb. 1888, p. 510 et Opusc. Ichn. 1088 ♂ ♀ (*nec* Grav.); Thoms. O.E. xiii. 1413 et xix. 2127, ? excl. ♀.

Head subbuccate and scarcely narrowed behind the eyes; both sexes with the palpi stramineous. Antennae twenty-two to -four jointed, black; beneath, at least basally, dull testaceous and, in ♂, scape and annellus white. Thorax black with a callosity before the radix in both sexes stramineous; areola longitudinally subconcave, not laterally costate but apically confluent with the petiolar region; spiracles circular. Scutellum black. Abdomen infusate- or piceous-testaceous, rarely in ♂ nigrescent, of ♀ subcylindrical and of ♂ linear and twice longer than head and thorax; very finely and densely punctate; segments darker, hardly more shining and not at all elevated at their apices; the anterior of the ♂ longer than broad; basal segment of ♀ little convex, subquadrate with obsolete carinae, of ♂ parallel-sided, slightly longer than the hind coxae, finely margined and obsoletely canaliculate apically; second segment of ♀ nearly as long again as third and broader and longer than the following; terebra as long as the abdomen and metathorax combined. Hind legs in both sexes with the white tibiae infusate at the apex and before the base, their tarsi infusate with the three first joints basally whitish; ♂ with the front femora strongly bisinuate, their tibiae arcuate, the anterior legs pale flavous, the hind femora mainly fulvescent or castaneous and their coxae black, all the trochanters and apices of the anterior coxae stramineous; ♀ legs fulvous with the tarsal claws basally lobate and the onychium double the length of the penultimate joint. Wings with stigma stramineous; radix and tegulae in both sexes stramineous; nervellus intercepting below the centre. Length,  $5\frac{1}{2}$ —10 mm.

Tschek does not suggest the synonymy of *P. nucum*, Ratz., with *P. calobata*, Grav. (and only queries it as identical with *P. nucum* Holmgr. and *Ephialtes inanis*, Grav.). Taschenberg and Schmiedeknecht (O. l. 1089, Note 1) say they cannot regard them as distinct, the latter adding that, according to Thomson, *P. calobata* has a rather longer terebra, "aber gerade die Bohrerlänge differiert bei den einzelnen Individuen sehr" and, on this account, he also includes *P. stramentaria*, Kriech., under this species. Thomson, who gives (O. E. 1413) the terebra of *P. calobata* as nearly as long as the abdomen, also says (2127) that the apical border of its segments is black, distinct and broader than in *P. nucum*, Ratz. I am strongly of opinion that Schmiedeknecht is in error in uniting *P. calobata*, which has the apices of the segments elevated and nitidulous, with *P. nucum*, Ratz., in which they are quite flat and hardly at all more shining than the remainder of the abdomen. Thomson's ♂ *P. calobata* certainly belongs to this species, but his ♀ with its terebra shorter than the abdomen must be distinct. He says that it agrees with his *P. puncti-*

*ventris* in its short cheeks, apically depressed and somewhat deeply emarginate clypeus, subemarginate eyes the inner orbits of which are not parallel, centrally subretused vertex, centrally not very distinct occipital costa, filiform antennae, distinct notauli, circular metathoracic spiracles and incomplete areae, the position of the nervellus, narrow abdominal epipleurae and lobate ♀ onychii; the latter, however, has the front femora simple, the second segment subquadrate and is obviously distinct.

Schmiedeknecht, placing little reliance upon the length of the terebra, suggests the synonymy with his *P. calobata* of *P. brunnea*, Brisch., in which it is two-thirds the abdominal length, *P. cingulatella*, Costa, about equal length, and *P. cingulata*, Ratz., in which it is as long as the whole body.

Ratzeburg bred (*l.c.*) two females of this species from a large number of beech-nuts in which a few larvae of *Tortrix splendidana* had been feeding; with them appeared *Bracon cordiger*, Nees. Towards the end of May, Nordlinger (*l.c.* ii. 90) found these females swarming on the window of a room at Hohenheim, in which beech-nuts bored by *Curculio nucum*, were stored; Zeller also bred a single female on 18th April from acorns, "hence probably from the *Balaninus* within them." The latter host is regarded as doubtful by Ratzeburg (iii. 250) and the former not even referred to (iii. 261). From two collections of fallen acorns, in which the larvae of some unknown and already emerged insects has subsisted, Tschek raised between 14th April and 3rd May thirteen females and two males of *P. nucum*, Ratz. which was the only parasite bred; there was in these no disparity in the length of the terebra nor in any other structural character. The previously unknown male emerged in both collections at the same time as the first female, with which, he says, there is no doubt whatever of their correct association. Schmiedeknecht says he has taken many females in Thuringia flying round oaks in September, though it is doubtful to what species he refers. Thomson says his *P. calobata* was bred from *Cynips terminalis*, in the Isle of Oland, and argues that it is consequently synonymous with that of Ratzeburg, which Reissig bred from galls of the same host at the end of March in Germany.

Wilson records this species (Yorks. Nat. 1881, p. 153) from the neighbourhood of York and it is said (Vict. Hist.) to have occurred at Hastings; but probably both Bignell's record of it as bred on 15th August from a pupa of *Dianthecia*, the larva of which had fed upon *Lychnis diurna*, and the record of it in Proc. S. Lond. Soc. 1896, as bred from some lepidopteron in thistle-stems at Howth, refer to *P. calobata*, Grav. I have taken but a single pair, both in woods among oaks: the ♂ at Monk Park Wood and the ♀ in Bentley Woods, both in Suffolk in May; Capron took a single female about Shere, in Surrey; and I also possess two females and one male, all captured at the same time at Giffnock, in Scotland, on 26th May, 1899, by Dalglish. None of the six specimens exceed six millimetres in length. This species is recorded, probably unreliably, from *Tortrix sorbiana*, *Ephippiphora fauciana*, *Eupaccilia ciliana*, a *Lithocolletis* on birch (Entom. 1883, p. 67), *Gelechia anthyllidella*, *G. inopella* and *Laverna epilobiella* (*lib. cit.* 1884, p. 71) and from *Eupithecia linariata* (Buckler). Mr. Bankes has bred a female at Corfe Castle, in Dorset, between 1st and 9th June, 1903, from *Clepsis rusticana*, Tr.; the only doubt upon the circumstance being founded on the small size of the host. There is a pair of both sexes in Marshall's collection, in the British Museum, bred by Bignell "from *Glyph* [*ipteryx*] *Haworthiana*, 18th May, '91;" and I have also seen females raised by the latter from *Coccyx strobilella* in spruce fir cones from Rannock.

22. *inanis*, Schr.

*Ichneumon inanis*, Schr. F.B. ii. 293, ♂. *I. Rayellae*, Schr. *lib. cit.* n. 2114. *Epialtes inanis*, Gr. I.E. iii. 247; Brisch. Schr. Ges. König. 1864, p. 178, ♂; Schr. Nat. Ges. Danz. 1880, 109; Schm. Opusc. Ichn. 1138, ♂ ♀. *Pimpla inanis*, Thoms. O.E. viii. 754 et xiii. 1413, ♂ ♀.

♂. Head entirely black and hardly narrowed behind the very slightly emarginate eyes; frons shining, obsoletely punctate and pilose, centrally canaliculate with large scrobes; clypeus depressed and apically emarginate; face with grey pilosity and palpi white. Antennae filiform and somewhat longer than half the body; beneath sometimes entirely dull testaceous, though generally substramineous with the scape and pedicellus white. Thorax subcylindrical, black with a white callosity before the radix; mesonotum deplanate, shining and finely pubescent; pleurae strongly nitidulous and finely pilose; metathorax compressed, subglabrous and longitudinally sculptured on either side of the subintire, elongate and only slightly explanate areola; petiolar region short and distinctly costate laterally; spiracles circular. Scutellum black. Abdomen narrow and more than twice longer than the thorax, linear-cylindrical and very distinctly punctate and pilose, with the segments apically subelevated and nitidulous, bearing inconspicuous lateral tubercles; basal segment strongly bicarinate throughout, laterally margined and rugulose, rather more than twice longer than apically broad; second coarsely punctate with large gastrocaeli occupying nearly its whole base; second to fifth very rarely dull ferrugineous basally; ventral valvulae not exerted. Legs somewhat slender with the front femora broadly emarginate or almost excised beneath; their tibiae subarcuate and the first joint of their tarsi basally excised beneath; anterior legs flavous or stramineous with the coxae either flavous throughout, fulvous above or basally black, and their trochanters stramineous; hind coxae rarely entirely black or fulvous, but generally red with the base or a dot black; hind trochanters stramineous; their femora fulvous and tibiae pure, bright stramineous with the apex and a semi-band before their base determinately fuscous; hind tarsi pure stramineous, with the joints more or less narrowly nigrescent apically. Wings hyaline or slightly clouded; stigma piceous or infuscate; radix and tegulae white; areolet irregularly transverse-triangular, sessile or subpetiolate; nervellus opposite and intercepting in the centre. Length, 7 mm.

♀. Brischke's description:—Black. Metathorax deplanately canaliculate. Abdomen narrow, coarsely punctate, deep castaneous with the apices of the segments black and nitidulous; the three basal segments longer than broad, the first longer than the hind coxae and about half as long again as broad; segments two to five with normal lateral tubercles; terebra somewhat longer than the body. Legs red, long and slender with the front tibiae arcuate and their femora not emarginate; hind tibiae apically and before the base infuscate, hind tarsi entirely concolorous. Stigma testaceous, nervellus intercepting in the centre. Length, 6—9 mm.

Thomson says the terebra is, as in *P. detrita*, short.

Holmgren did not know this species but expected that it would fall into his genus, *Colpomeria* (Sv. Ak. Handl. 1860, n. 10, p. 44); and consequently Marshall there placed it in the British Catalogue of 1872, referring to Tschek's surmise (Verh. z-b. Ges. 1868, p. 446) that it might be synonymous with *P. nucum*. Giraud (*lib. cit.* 1863, p. 1266) gives it as

the ♂ of *Pimpla arundinator* (q.v.). Thomson, however, treated it as a true *Pimpla* (*Scambus*) allied to *P. detrita* in its subopposite and hardly postfurcal nervellus, short and apically obtusely rounded spicula, elongate and in ♀ stout onychii, the elongate second ♂ abdominal segment and excised front femora. Schmiedeknecht relies entirely upon Brischke as regards the ♀, which, if bred, is likely to be correctly associated and says it has marked *Ephialtes*-characters. I do not know the ♀, so can express no opinion upon it, except that Thomson is very unlikely to err in a matter of affinities; the ♂, however, is very decidedly a *Scambus* and extremely closely allied to *Pimpla calobata* and *P. sagax*—so closely that Dr. Brauns, some years ago, referred a ♂ of the former species in my collection to it. The doubt respecting Gravenhorst's types arises, as usual, through lack of any mention of them by Taschenberg.

This species was originally bred by Schrank solitarily from *Tortrix micana* and his *I. Rayellae* from larvae of *Tinea Rayellae*. Gravenhorst found it among undergrowth in Germany towards the end of August. Giraud's doubtful record is from Piedmont and Thomson's from Sweden. Brischke bred it in Prussia from *Retinia resinella*, *Tachyptilia populella* and the cocoon of some *Nematus*. Its synonymy is yet too mixed, however, for distributional records to be reliable. There are no localised British records of this species, which appears to have been introduced by Desvignes in 1856. I have seen males captured by Beaumont at Plumstead in July and Enniscorthy early in September. There are six males in my collection, taken at Lasingham in Yorkshire by Marshall, Rookley Wilderness in the Isle of Wight by myself in June and early in August by Morey, Tostock in Suffolk in June by Tuck; and by myself in Barnby Broad in early June, and sitting on a leaf of *Cornus sanguinea* in my garden at Monks' Soham early in June, just before dusk.

### 23. *detrita*, Holmgr.

*Pimpla graminellae*, Gr. I. E. iii. 181. ♀ (part.); Gir. Verh. z-b. Ges. 1863, p. 1290, ♂. *P. detrita*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 23; Thoms. O.E. viii. 753 et xiii. 1413, ♂ ♀; Schm. Zool. Jahrb. 1888, p. 514, excl. ♂ (*nec* Brisch.). *P. Gravenhorstii*, Tasch. Zeits. Ges. Nat. 1863, p. 266, ♂ ♀.

A somewhat slender, black species with red legs and explanate onyches. Head black, smooth and shining, very slightly narrowed behind the but feebly emarginate eyes; face with griseous pilosity and finely punctate on either side; frons glabrous, deplanate and centrally canaliculate throughout; palpi of ♀ piceous, of ♂ white. Antennae almost two-thirds of the length of the body, filiform and subpilose; dull testaceous, with the ♂ pedicellus and rarely extreme apex of scape flavous beneath; first flagellar joint basally pale and hardly longer than the second. Thorax nitidulous and black, with a flavous or rufescent callosity before the radix; mesonotum obsoletely punctate and centrally deplanate with anteriorly distinct notauli, which in ♀ coalesce discally; pleurae glabrous and nitidulous, sternum finely punctate with long and sparse hairs; metathorax somewhat narrow with griseous pilosity, nitidulous with distinct and diffuse punctures, laterally longitudinally sulcate; areola narrow, parallel-sided, distinctly costate laterally and incomplete apically; petiolar region glabrous, spiracles circular. Scutellum black, subdeplanate, obsoletely punctate and pubescent. Abdomen black throughout, coarsely punctate and pubescent though more finely towards the anus, of ♂ parallel-sided and of ♀ distinctly constricted towards base and



apex, with feeble tubercles which in ♂ are distinct only on segments four and five; basal segment of ♀ somewhat distinctly and of ♂ twice longer than its apical breadth, laterally margined and scabrously punctate with a subglabrous central canaliculation, extending to near apex; second segment with distinct basal transverse foveae; apices of the segments glabrous, elevated and nitidulous, especially in ♀; those of the ♂ more strongly pilose with the eighth subretracted with inconspicuous valvulae; terebra less than half length of abdomen (abdomen  $4\frac{1}{2}$ , terebra 2 mm.), with the valvulae transaciculate, elongately setigerous with ferrugineous spicula. Legs fulvous; all the ♂ and front ♀ coxae infusate or black; hind tibiae of ♀ testaceous and of ♂ white, with the apex and an often obsolete band before the base subinfusate, more distinct in ♂; all the tarsal claws nigrescent and in ♀ basally lobate, with the onychii and pulvilli obviously explanate; ♂ with the front femora distinctly emarginate beneath and the front tibiae somewhat distinctly though not strongly arcuate; its anterior trochanters entirely and the hind ones beneath flavous; in both sexes the hind tarsi are subinfusate with the basal half of the apical joint sharply paler. Wings sometimes clouded or flavescent; areolet sessile and transverse with the outer nervure, especially in ♀, pellucid at base and apex; lower basal nervure distinctly, and the radial apically slightly, curved; stigma piceous with its base dull testaceous, radix and tegulae stramineous; nervellus distinctly though not strongly postfurcal, intercepting in both sexes exacting in the centre. Length,  $5\frac{1}{2}$ —9 mm.

Described from a pair taken *in cop.* (9 vi. 02).

This species, for so long mixed under Gravenhorst's too comprehensive though still incomprehensible *P. graminellae*, differs from that species, as described by Holmgren, and the allied *P. brevicornis* in its narrower body, less tuberculate abdomen, usually short terebra and emarginate ♂ femora and is allied to *P. arundinator* and *P. melanocephala* in its explanate onyches; it cannot be the insect bred by Brischke from *Lipara lucens* and *Sesia formicaformis* and referred by him doubtfully to the present species—as given by Schm.—since he says the nervellus is unter der Mitte gebrochen. I see no reason to suppose that Thomson assigned an incorrect ♂ to the present ♀; he simply points out and very truly that the front tibiae are less arcuate than in its allies. It is an abundant species throughout Europe and is said by Schmiedeknecht to have been bred from *Chilo phragmitellus* but, since this is based upon Bignell's record from Devon, which in reality refers to *P. melanocephala*, it must also be expunged; the same author's ♂ is certainly wrongly associated with this species, since it is said to have the nervellus intercepted far below the centre, etc.

Bridgman, somewhat uncertainly, recognised this species as distinct from its allies in Britain (Entom. 1880, p. 55 et Trans. Ent. Soc. 1881, p. 167) and says it is not uncommon about Norwich; later he records it as generally common in Norfolk. It is one of the most abundant species of the genus in England and has been taken in Ireland. It is most frequent upon Angelica flowers in marshy situations towards the end of August, but both sexes are abroad by the end of May and I have taken the female, still the commoner sex though by no means to the same extent as in most of its allies, as early as the 13th of that month. It is strongly attracted by flowers and is found at first on those of the late blackthorn, then on *Chacrophylum* and whitethorn, later on *Heracleum* and fennel, and finally on those of *Angelica sylvestris*, *Daucus carota*, and *Cnicus palustris*, which it continues to frequent up to the 18th September. It is,

too, often taken by sweeping low herbage and reeds, sometimes after dark, and a few of my hundred and fifty specimens were beaten from sallow, aspen and birch in the spring; it does not appear to especially affect salt-marshes, though I have swept the males there in early June. Among the males of the smaller species of this genus those of the present are by far the commonest in Britain. I have noticed that the female is often seen upon the seeding *Angelica* plants, after all the blossom has fallen; but whether she be searching for some caterpillars feeding on the seeds (? *Eupithecia albipunctata*, *E. irisignaria*, *E. coronata*, etc.) or seeking *Syrphid* larvae among the Aphid, similar to *Aphis rumicis*, so abundant

on the stem just beneath the seeds, I have been unable to ascertain.\* My rough sketch will give some idea of the peculiar angle at which the antennae, wings and abdomen are habitually held at rest.



\* Dr. Giraud, in his "Notice sur les déformations galliformes du *Triticum repens* et sur les insectes qui les habitent" (Verh. z.-b. Ges. 1863, pp. 1289-96), throws out a hint respecting the early stages of this species, which might be followed up with considerable economic advantage. Both sexes were obtained in very great numbers by him from galls on *T. repens* in the high ground of Laaenberg, near Vienna, and more sparingly in Lower Austria; these were perhaps, but very uncertainly, made by a small Dipteran, named by Schiner *Ochtiphila polystigma*, Mg., which also occurs in Britain. He says, however, that the *Pimpla* larva is so frequent in the two hundred or more galls that he examined that, lacking direct knowledge of their maker, one might suppose these larvae to be the legitimate proprietors; and adds "Une circonstance curieuse et que je n'ai eu occasion d'observer ailleurs que bien rarement, c'est que cette larve paraît tirer la plus grande partie de son alimentation de la plante même. C'est la une dérogation aux lois ordinaires qui régissent l'économie des parasites, mais cette exception me paraît incontestable et plusieurs espèces, de genres très différents, en fournissent des exemples. Surpris de trouver ces larves constamment seules dans le canal des galles, sans qu'il me fût possible de reconnaître la moindre trace de celles que je devais supposer leur avoir servi de pâture, j'ai répété mes recherches à une époque de l'année où je pouvais espérer de les rencontrer encore dans leur jeunesse. Dès le mois d'août, je les ai vues à divers degrés de développement et souvent n'ayant encore que le tiers ou même le quart de leur taille à l'état adulte; mais, ici encore, il n'y avait aucun vestige de la victime que je cherchais. Les larves se trouvaient, le corps étendu en ligne droite, dans une cavité proportionnée à leur volume et tout-à-fait remplie par elles. . . . Si l'on tient compte de l'absence de toute victime pendant que la larve est encore jeune et continue à se développer, comme de l'agrandissement de la cavité qui la renferme à mesure que sa croissance augmente, on ne peut se refuser d'admettre que la larve ne soit phytophage, au moins pendant une grande partie de son existence. Quoiqu'il en soit, l'insecte producteur de la galle a dû périr dès les premiers jours de l'éclosion de larve, ou peut-être même à l'état d'œuf." He suggests that the *Pimpla* takes to a phytophagous diet after demolishing its small and insufficient host during its own early stages, which is altogether contrary to one's established ideas; we must, however, remember that "there is nothing fixed in Nature" (cf. also E.M.M. 1877, p. 201).

The *Pimpla* larva living in these galls he figures (l.c. pl. xxii, fig. 2a) and describes as apodous, glabrous, subdeplanate and flavidous white. The head is small, oval and scaly, with the face bearing some slight and arcuate impressions; the labrum is large, ovoid, distinctly circumscribed by a fine and impressed line, its broad apex forming a free margin, which is rufescent and has the appearance of a small comb composed of seven teeth, of which the intermediate are more projecting; the lower lip is concealed in part by the labrum on which it rests; the mandibles are basally indicated by two red marks and apically concealed beneath the labrum; there are also very fine and conical antennae, indistinctly composed of three joints. Thirteen well-marked segments, with an outstanding lateral fold, preceded by a longitudinal depression, at the base of which are the spiracles in the form of nine pairs of little marks. Of these the first are on first thoracic segment and the remainder on the eight abdominal; the intermediate segments discally form an undulating or somewhat uneven surface. Length, 5 mm.

The larva is sometimes nine months in that condition and constructs no cocoon in which to pupate; Giraud only noticed its emergence from the end of March to the beginning of May.

The ♂♂ emerging from these larvae closely resemble *Ephialtes* (*Pimpla*) *inanis* and have, like it, the front femora emarginate; but they differ in their more slender body, less stout legs, etc. The antennae are dull brown beyond the second joint above, and nigrescent beneath; the basal joint is entirely black, whereas in *E. inanis* it is white-marked. The legs are testaceous-flavidous and not rufescent; front coxae nearly entirely black, intermediate only basally black, hind ones entirely black or very rarely dull red with their posterior surface nigrescent; all the trochanters and the hind tibiae whitish or very pale flavous, the latter with their apices and a mark near their base nigrescent; hind tarsi infuscate with the basal half of the first and base of the following joints pale. The emargination of the front femora, too, is somewhat different: it is more gradual and not undulating or bisinuate, as in *E. inanis*, and further the tibiae are a little less arcuate. Finally, the meta-thorax and basal segment are less rugulose, with the latter distinctly narrower and less strongly carinate discally.

I have translated the ♂ description in *extenso* since it is most important economically that there should be no mistake respecting the synonymy of these species which Giraud terms *P. graminellae*, Grav., and I am quite sure that he really refers to *P. detrita*, Holmgr. He remarks that, although the ♀♀ varied greatly in size, they were all undoubtedly co-specific.

I possess this species from Felden in Herts. (Piffard); in an office, City Road, in the heart of London (Newbery); Tostock, Bungay and Finborough Park, in Suffolk (Tuck); Rossbeigh, in Co. Kerry (Donisthorpe); Wimbledon and Chiswick (Sich); Lyndhurst (Adams); Shere, in Surrey (Capron); Ripple and Kingsdown, in Kent (Sladen); Greenings (W. Saunders); Mablethorpe in Lincs. and South Leverton, in Notts. (Thornley); Filton, near Bristol (Charbonnier); Thomwick Bay, near Flamborough and Moulton, in Suffolk (Elliott). I have noticed it in Suffolk at Icklingham, Assington, Southwold on carrot, Marlesford, Farnham, Bruisyard, Rishangles, Kentford, Brandon marshes, Herringswell Fen, commonly in Tuddenham Fen, flying on outskirts of Bentley Woods, Alderton on *Foeniculum vulgare*, Harleston, Henstead marsh, Claydon bridge, Barnby Broad, Monks' Soham in my paddock, Badingham, Bramford marshes and Barham. Elsewhere it has occurred to me abundantly in Wicken Fen, in Cambs., at the beginning of June and there I beat from hawthorn flowers the above described sexes *in cop.* and I have taken them in the same interesting situation at the adjacent Devils Ditch; females have also been secured at Matley Bog in the New Forest, Shallfleet, Rookley and Yarmouth in the Isle of Wight; Wroxham, Filby, Winterton, Hickling and Surlingham, in the Norfolk Broads\*. But it is at Barton Mills, near Mildenhall, that I have especially noticed both sexes, which have there occurred on Angelica flowers in osier carrs, on the banks of the Lark River, in great profusion, during the last eight years.

[PIMPLA NIGRICANS, *Thoms.*

Head with the vertex hardly narrow and not emarginate behind the eyes; clypeus obviously depressed and emarginate apically; cheeks very short; all the orbits and ♂ face immaculate. Antennae not apically attenuate. No pale callosity before the radix, notauli distinct; metathoracic spiracles circular, areola incomplete. Abdomen tuberculate, of ♂ linear with the second segment longer than broad; terebra short, with the spicula apically obtusely rounded. Legs red, front femora of ♂ excised beneath; onychii elongate, and in ♀ stout with the claws basally lobate. Wings with the radial nervure hardly sinuate apically; nervellus subantefurcal and not intercepting above the centre.

This insect is described as a distinct species by Thomson (O.E. viii. 754) and placed in his genus *Epiurus* (*lib. cit.* xiii. 1413). He says it is very similar to *P. detrita*, but somewhat larger with the ante-radical callosities immaculate, the fifth tarsal joint not longer than the third, in ♀ the glabrous apices of the segments are a little broader and in ♂ the scape and coxae are entirely black. I certainly consider that Smiedeknecht was more correct in his earlier consideration of this form as a variety of *P. detrita* (Zool. Jahrb. 1888, p. 514) than in allowing it specific rank as is done in Opusc. Ich. 1099. If the keen-eyed Thomson could find no better grounds for discrimination, we may rest assured that it is at most but a variety of *P. detrita*: "Eine scharfe Grenze zwischen dieser Art und der *P. detrita* existiert nicht."

I have not searched through my long series of the former species to find this form, which is said to be rare in southern Sweden and has been recognised nowhere else on the Continent, since Bridgman's introduction

\* In very wet and wild marshes, such as Horning, Ranworth, Wroxham, Surlingham, Rockland Broads and Wicken Fen, I have taken a form of the ♀ differing in nothing but its longer terebra (abdomen 4½, terebra 2½, mm.).

of it as British (Trans. Ent. Soc. 1887, p. 376) is sufficient to establish its indigenoussness. He says that Champion took a single female at Box Hill; and that it may be further known from *P. detrita* by having the abdomen a little shorter and the terebra a little longer.]

#### 24. *ventricosa*, Tschek.

*Pimpla ventricosa*, Tschek, Verh. z.-b. Ges. 1871, p. 40; Schm. Opusc Ichn. 1093, ♀.

A black and deplanate species with unusually broad wings and no abdominal tubercles. Head immaculate, not or only very slightly broader than the thorax and not narrowed behind the entire eyes; ocelli elevated upon a plateau encircled by a depression within which is a longitudinal furrow between the two posterior ocelli; occiput emarginate; frons glabrous, sparsely pilose and centrally canaliculate; mandibles parallel-sided with the apical teeth of equal length; face uneven; palpi and ligula of ♀ testaceous, of ♂ stramineous. Antennae half length of body, filiform, black; beneath concolorous, or sometimes ferrugineous and basally testaceous; scape usually immaculate in both sexes. Thorax subdeplanate with a testaceous callosity before the radix; mesonotum nitidulous and finely pilose, with in ♀ obsolete and in ♂ distinct notauli; metathorax shallowly and sparsely punctate with testaceous pilosity; areola and petiolar region glabrous, former laterally subexplanate and somewhat distinctly costate with the apex indeterminate; spiracles small and circular. Scutellum black and subconvex. Abdomen deeply but evenly punctate, deplanate, immaculate; basal segment of ♀ not longer than, of ♂ about half as long again as, apically broad, laterally subrugulose with the basal excavation extending to near the deeply punctate apex; apices of the segments broadly nitidulous but not elevated; ventral valvulae of the ♂ strongly exerted; terebra as long as the abdomen, strongly setigerous with the spicula slender, apically acuminate, ferrugineous or stramineous. Legs fulvous and not stout; ♀ with trochanters, except sometimes base of the posterior, often flavescent; ♂ with all the coxae black, the front femora broadly emarginate beneath and their tibiae strongly arcuate; intermediate tibiae flavescent with apex, and a dot before the base, fulvous; hind tibiae and tarsal joints testaceous with the apices of both broadly, and a band before the base of the former, nigrescent; first joint of hind tarsi setiferous beneath, with the basal half pale and the calcaria concolorous; claws of ♀ basally acuminately and finely lobate. Wings of ♀ flavescent with the stigma luteo-fulvous and darker margined throughout, or like that of ♂, hyaline with the stigma piceous throughout; radix and tegulae clear stramineous; nervellus subopposite and intercepting distinctly a little below the centre. Length,  $7\frac{1}{2}$ —8 mm.

This species is said to be similar to *P. brevicornis* but to be larger and at once known by the peculiarly broad head, which exceeds the thorax in breadth. This I think, however, must be a little exaggerated since in my females, which agree in every other particular, the head is certainly not broader than the thorax. The ♂ has not before been described and differs from the ♀ only in the directions above intimated. Both sexes are at once distinguished from all others of the genus by the most remarkable elevation of the ocelli, which, viewed from in front, rest like a diadem on the insect's brow, as well as by the broad wings and smooth abdomen. Possibly this is the species so doubtfully referred to *P. mandibularis* by Bridgman.

The only hitherto known specimens are five females recorded by Tschek from Austria, which he says measured 8.75-11 mm. in length. I have drawn the above description from two females and one male; the male was bred by Waterston at Edinburgh in the middle of June, 1899, from a chrysalis of *Melanippe fluctuata* and is in my collection; one female was captured by Elliott at Birnam on 1st August, 1901, and the second was bred by Banks at Ashford in Kent, early in July, 1901, from a larva of *Mompha (Laverna) conturbatella*, Hb. and had apparently itself, spun a white papyraceous cocoon inside a leaf, which contained but the merest débris, probably of the host, from which the imago had emerged through an almost square, small hole near one extremity. This species has not been noticed in Britain before, and would appear to be, as in central Europe, rare with us, though from the above localities it must be wide spread. There is a single female in the British Museum, with no name (referred to by me, Trans. Ent. Soc. 1907, p. 45), which I have little hesitation in ascribing to this species, though it is certainly atypical; it is labelled "Ichneumon of *Lixus angustatus*, Fairlight, Aug. 31st; F. Smith." This is the only known parasite of *L. algirus*, Linn.

## 25. *mandibularis*, Grav.

*Pimpla mandibularis*, Gr. I. E. iii. 180, ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 27; Tasch. Zeits. Ges. Nat. 1863, pp. 62 et 269; Brisch. Schr. Nat. Ges. Danz. 1880, p. 113; Thoms. O. E. viii. 750 et xiii. 1413; Schm. Zool. Jahrb. 1888, p. 533, ♂ ♀.

Head transverse, hardly narrowed behind the eyes; face dull, punctate and centrally prominent; clypeus depressed and apically emarginate; palpi, centre of mandibles, sometimes the clypeus and apices of the short cheeks, stramineous; ♂ usually also with the face entirely, or laterally and two central lines, stramineous. Antennae slender, filiform, longer than half the body and not apically attenuate; black and apically testaceous beneath; ♂ with the eighth to fourteenth joints bearing raised lines. Thorax black and nitidulous with distinct notauli and a stramineous callosity before the radix; metathorax with eight or ten areae, usually distinctly discreted; areola entire, a little longer than broad, basally rounded, centrally depressed and apically complete and truncate; lateral areae distinctly costulate, though often externally subincomplete; spiracles somewhat small and circular. Scutellum immaculate. Abdomen flat, elongate, subequilateral, as broad as and almost double length of thorax, densely and finely alutaceo-punctate and dull, with obsolete tubercles; apices of segments usually castaneous, little shining and only slightly elevated; basal segment somewhat longer than apically broad, bicarinate and rugulose; second segment impressed with an oblique line on either side and, with the two following, longer than broad; anus more shining, ♂ with apical ventral segment produced; terebra longer than half, usually almost as long as, the abdomen with the valvulae pilose, black with their apices flavous, spicula stout, badius or black. Legs somewhat elongate, red; front ones of ♀ and all of ♂ with the coxae mainly black; hind ones with tarsi and tibiae infusate, the latter basally white-banded and internally more or less ferrugineous; apical joint of hind tarsi thrice longer than penultimate, claws, simple and not basally lobate. Wings not or hardly clouded, stigma and radius piceous, radix stramineous; tegulae of ♀ infusate though sometimes pale-marked, of ♂ entirely or

partly pale; areolet triangular and sessile or obsoletely petiolate; nervellus subantefurcal and intercepting hardly below the centre. Length, 10—12 mm.

The metathoracic areae, abdominal puncturation and capital pale markings render this species abundantly distinct among those found with us. It is said to be not rare in northern Europe and has been found in three or four localities as far south as central Germany, where it occurs from June to September.

Bridgman brings this species forward as British (Trans. Ent. Soc. 1881, p. 167) on the strength of uncertain notes of his (Entom. 1880, p. 55): "Amongst some ichneumons collected was a specimen of *Pimpla* I could not identify as belonging to any recorded British species. It appeared to me to answer best to Gravenhorst's *P. mandibularis*. Mr. Fitch has sent it to Dr. Kriechbaumer, who does not agree with this determination, but was not able to name it. It was then sent with some other ichneumons to Herr C. G. A. Brischke, who says it most probably is *P. mandibularis*, and so for the present it must remain." And it has remained so ever since.

## 26. *instigator*, Fab.

*Ichneumon instigator*, Fab. E.S. ii. 164, ♀; Panz. Schaeff. Ic. pl. cv., fig. 5, ♂. *Cryptus instigator*, Fab. Piez. 85. *Sirex spectrum*, Don. B.I. vii. pl. 225, ff. 1 et 2, ♀; cf. Ste. Ill. M. vii. 115. *Pimpla instigator*, Gr. I.E. iii. 216; Curt. B.E. pl. ccxiv., ff. 1-5; Zett. I.L. 375; Ratz. Ichn. d. Forst. i. 116; et iii. 99, pl. iv., fig. 1; Curt. F.I. 99; Holmgr. Sv. Ak. Handl. 1854, p. 87; *lib. cit.* 1860, n. 10, p. 18; Tasch. Zeits. Ges. Nat. 1863, pp. 52 et 261; Thoms. O.E. viii. 746 et xiii. 1408; Schm. Zool. Jahrb. 1888, p. 470, ♂ ♀. Var. *P. intermedia*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 19, ♂ ♀. Var. *P. processionea*, Ratz. Ichn. d. Forst. iii. 101, ♂; cf. Tosq. Ann. Soc. Belg. 1897, p. 283.

A large black species, with only the femora and tibiae red. Head transverse, somewhat short and strongly narrowed behind the eyes; frons concave and subexcavate, transversely aciculate with a longitudinal central impressed line; clypeus basally elevated, strongly depressed towards the glabrous and subtruncate apex; eyes oblong-ovate and moderately emarginate next the scrobes; face strongly and evenly punctate with long black hairs, centrally convex with a longitudinal and often subglabrous line; mandibles stout and coarsely punctate, margined below; palpi of ♂ stramineous, of ♀ with the three apical joints fulvous. Antennae a little shorter than the body; of ♀ very slender, filiform throughout with the basal flagellar joints apically subnodulose and the first nearly half as long again as the second; of ♂ stouter, apically subattenuate with the basal flagellar joints much shorter; flagellum sometimes dull ferrugineous beneath, scape punctate. Thorax stout, gibbous, immaculate; mesonotum and mesosternum evenly punctate and nitidulous, with obsolete notauli; mesopleurae strongly punctate and posteriorly strigose; metathorax subdeplanate and scabrous with the areae wanting, lateral carinae stout and obtuse, and spiracles oblong. Scutellum deplanate, shining, glabrous with sparse brown pilosity, black; of ♂ rarely binotated with flavous. Abdomen black, of ♂ subcylindrical, of ♀ oblong-ovate, longer and hardly narrower than the head and thorax; first segment not carinate, basally excavate, centrally bituberculate in ♀, and apically subelevated; the four basal segments scabriculously punctate with a subobsolete transverse impressed line and a small oblique basal impression on either side, apically shining and slightly elevated; the

following smoother with no impressions; terebra hardly half length of the abdomen, with valvulae shortly pilose. Legs somewhat stout, red or fulvous; coxae and trochanters black, with the latter sometimes apically red; hind tarsi, except rarely basally, black; claws stout, curved, ferrugineous, distinctly longer than the pulvilli, neither pectinate nor in ♀ basally lobate. Wings normal, sometimes more or less slightly clouded; stigma and radix black or piceous, with the former always distinctly paler basally; tegulae black, usually white-marked and in ♂ often entirely pale stramineous; areolet sub sessile, subtransverse; internal cubital sinuate, with no nervelet; nervellus strongly postfurcal and intercepting far above the centre. Length, 10—20 mm.

This is an unusually constant species and I can find no variation, except that of size, in any of my ninety specimens. The var. *intermedia* is very distinct in its constantly smaller size (circa 9 mm.), the frons less excavate with vertex more closely punctate, metanotum basally subcanaliculate, apices of abdominal segments always more or less rufescent, stigma fulvous and hardly paler basally, and the eyes internally more deeply emarginate. It is very probably a good species; and it has not before been noticed in Britain.

A very lucid account of the structure of this species, as illustrating that of Ichneumonidae in general, is given by Westwood (Introd. ii. 137-140); it is also well figured by Van Vollenhoven (Pinac. pl. ix, f. 1), and poorly by both Newman (Hist. Ins. p. 6) and Wood (Ins. at Home, 323). Ratzeburg (iii. 99) says that this was by far the commonest parasite upon *Bombyx processionea*, during the great plague of that species in the Dessau district in 1849-50; in those places which had been entirely defoliated it swarmed in countless numbers; in damp weather only round the oak stems, in sunshine everywhere. These swarms consisted entirely of males, since the females migrated to where the host-larvae was still devastating. He records how one unprotected caterpillar, separated from its fellows who were under their web, was suddenly stung in its back by this ichneumon; the larva threw itself over, remained on its back for about a minute immovably, then slowly regained its feet and joined its fellows as though nothing had happened. Finally, he notes the emergence of a small male of three lines from *Nematus salicis*. Bouché tells us (Naturg. 146) that the digestive tube of its larva shows grey through its skin, together with several whitish granules; he makes no mention of pseudopods.

This species which is among the largest of the genus in Europe, is very common both here and abroad. It is one of the oldest known insects, since it is recorded under the name *Musca bipilis secunda* by Moufet from the neighbourhood of Oxford as long ago as 1634 (Ins. Theatr. p. 63); and is most probably confined in the parasitism to the Lepidoptera, as the only two records from *Tenthredinidae* require confirmation. Gravenhorst, including what little was known earlier, records it from pupae of *Bombyx auriflua*, *B. chrysorrhoea*, *B. monacha*, *B. cramina* and *B. libatrix*; he says it occurs in grassy places and upon umbells throughout the summer, and has been found at Netley in Shropshire. Ratzeburg adds to its hosts *Bombyx dispar*, *B. pini*, *Noctua piniforda*, *Papilio brassicae*, *Bombyx salicis*, *B. caeruleocephala*, *B. pudibunda* and *B. neustria*. Taschenberg bred it from *Orgyia gonistigma*; Brischke from *Aporia crataegi*, *Psyche viciella* which seems a wondrous small host, and, he says, *Nematus perspicillaris*, in Prussia; Giraud (Ent. Soc. Fr. 1877,

p. 409) from *Aporia crataegi*, *Onceria dispar* and the small *Psyche graminella*. We have quite as many hosts again in Britain, where Marshall (Ent. Ann. 1874, p. 125) bred it from *Ptilodontis palpina*, *Cymatophora ocularis*, *Liparis salicis*, *Pontia brassicae*, *Smerinthus tiliæ* and *Arctia menthastri*; Newman (l.c.) from *Chelonia caja*; and in The Entomologist we find *Zygacna filipendulae*, *Liparis chrysorrhoea*, *L. auriflua*, *Arctia caja*, *Pygera bucephala*, *Gonoptera libatrix*, *Lithosia quadra*, *Ennomos tiliaria* (1883, p. 67); *Triphaena fimbria* (1884, p. 68); *Liparis salicis* (1880, p. 68); and *Dipththera orion* (1881, p. 141). Buckler adds *Hadena chenopodii*, *Vanessa atalanta*, *Ypsipetes ruberaria* and *Smerinthus populi* as alternative hosts. The above, however, are mere records with no details; Curtis (Farm Insects, 98) tells us that the larva lives singly in the chrysalis of *Pontia brassicae*, and there changes into a white pupa, without forming any cocoon of its own; he says the imago hatches in two or three weeks and emits a most offensive scent when touched; he had often seen females running over fruit trees and investigating every leaf and crevice to find a proper object to receive their eggs, and limits their perfect state from midsummer to Michaelmas. Marshall (l.c.) confirms its solitary habits and says it undergoes its transformations with no other covering than the skin of its victim; "a parasite which I found in January in a pupa of *P. brassicae*—a naked maggot within the dry shell—lived in that state without food till the spring, when it changed to a pupa, and afterwards emerged as *Pimpla instigator*, although I twice opened its case to see the contents, and afterwards repaired it with a piece of paper." Bairstow adds (E.M.M. 1879, p. 36) that Harwood forwarded him some pupae of *Selenia lunaria* from which many of this parasite were bred. The larvae became pupae about April 20th and imagines from 5th to 25th of May. Thirty or forty males were bred with no female, which, he says, is the commoner sex on the wing; he suggests that the females may emerge later. The host-larvae were feeding in a canvas-covered enclosure, and the parasites, creeping through the canvas, "performed their mission in a most deadly manner." He adds it is a very common enemy of *Odonestis polatoria*. My own experience is not extensive, though closer: on 24th May, 1892, two very large females emerged from two chrysalids of *Smerinthus tiliæ*, which I had dug at the base of an elm near Beccles during the preceding November, when I had broken one open and found it contained a large larva which itself repaired the hole with dark testaceous, horny secretion of great strength; it emerged from the extreme anus of the pupa, which was entirely excised. Again, on 19th April, 1893, a female emerged from a pupa of *Arctia menthastri*, which I had dug in the marshes at Ipswich during the preceding February; it emerged through the extreme capital end of its host's pupa, removing the entire operculum, which was irregularly bitten round. The anal end of the pupa contained the parasite's larval skin, surrounded by what appears to be its exuviae but which are more probably eggs from the host-pupa; the capital two-thirds of the pupa were spun over irregularly with strands of dull white silk, but forming no distinct cocoon. Blair sent me a specimen bred in North London from *Orgyia antiqua* on 28th October, 1903—a very late date—remarking "Pupa of parasite lies free within the partially cleared pupa of the host." Revd. C. D. Ash, who bred it at Skipworth in Yorks from a pupa of *Acronycta menyanthidis*, of which he found the larva there during the preceding August, confirms Curtis' notice of the pungent odour when first emerged.



I possess specimens bred at Ipswich on 1st April, 1893, from a pupa of *Taeniocampa* sp. by myself; at High Wycombe in Bucks., on 6th April, 1901, from *Amphydasis betularia* by Peachell; at Worcester from *Cymatophora ocularis*, by South; at Hackney marshes from *Stilpnolia salicis* by Image; from ?*Orgyia antiqua* at Finsbury Park, in August, by Janson; at Ashby near Doncaster from *Dicranura furcula*, by Cassal; at Rochester in the middle of June, from *Cucullia verbasci*, by Ash; and from *Smerinthus populi* at Leeds on 27th May, 1873, by Eagle Clarke. I have seen others bred at Oxford in July, from *Bombyx neustria* by Hamm; in Scotland in April, from *Acronycta myricae* by Major A. Ficklin; at Selby in Yorks on 15th May from *Odontopera bidentata* by Rev. C. D. Ash; and it is doubtfully recorded from *Noctua nupta* by Jenyns in the Vict. Hist. Cambs. I possess specimens taken at Knowle (Ellis), Birmingham (Bradley), Ipswich (Morley), Deal (Donisthorpe), Suffolk (Dr. Garneys), Tuddenham Fen (Sparke), South Leverton, Nottingham and Belton near Grantham (Thornley), Ely and Brockenhurst (Cross), Redland near Bristol in May, June, July, August and September, together with males of the var. *intermedia* both there and at Lynmouth in July (Charbonnier), Avington; Worthing (W. Saunders), Rossbeigh in Co. Kerry (Donisthorpe), Woolwich (Bedwell), Lyndhurst in May, June, July and August (Adams), New Forest (Miss Chawner and Gibbs), flying along a paddock hedge at Newport, I.W. at the end of June (Morley), Hastings (Esam and Butterfield), Shere in Surrey (Capron), Feldon, together with both sexes of the var. *intermedia* (Piffard), Tostock and Bury St. Edmunds (Tuck), Pannal near Harrogate (Roebuck); and Bedwell has given me a female which he took at Westerham, on 4th June, 1900, "sitting on a post full of *Callidium alni*" (cf. Trans. Ent. Soc. 1907, p. 25).

I have seen others from Littlehampton (Elliott), Alderney (Luff), Sutton near Birmingham (Bradley), Arnold near Nottingham (Carr), Shotover and Cowley marsh near Oxford (Hamm), Nottingham near Weymouth (Richardson), Newton Abbot in North Devon (Hamm), Battle in Sussex and Wymondley in Herts. (Butler), Ripley (Morice), St. Ives in Cornwall (S. Edwards), Selsley, Handsworth and bred in July from a pupa beneath willow bark at Kenilworth (Martineau), Hucknall near Nottingham (Carr), Kings Lynn (Atmore) and Barton-on-Humber (Mason). It is recorded as common at Ely, Swaffham Bulbeck and bred at Anglesey Abbey by Jenyns; from Lasingham and Huddersfield in Yorks by Marshall and Bairstow; as common in Norfolk by Bridgman; very common in Devon by Bignell; from the Lands End by Marquand; and from Glanvilles Wootton by Dale. It is bred, I believe invariably from chrysalids, from early April to the end of October; but on the wing the earliest date is 30th April, 1901, when Cross took it at Ely and the latest the 30th September, when Elliott found it on a house-window of Holland Park, in London, in 1902. Giraud saw a large female oviposit in a chrysalis of *Bombyx dispar*, and twenty days afterwards a female, as large as its parent, emerged from it (Verh. z.-b. Ges. 1863, p. 1202).

## 27. *aethiops*, Curt.

*Pimpla aethiops*, Curt. B. E. fol. ccxiv, ♀. (?) *P. aterrima*, Gr. I. E. iii. 215; Tasch. Zeits. Ges. Nat. 1863, pp. 62 et 262; Schm. Zool. Jahrb. 1888, p. 473, ♀.

A large black species with dark wings and only the anterior legs partly red. Head immaculate, distinctly transverse and not very broad behind the somewhat strongly emarginate eyes; vertex coarsely punctate with piceous

pilosity; frons punctate with the interstices reticulate, anteriorly transversely aciculate and centrally canaliculate throughout; face strongly and subconfluently punctate with stout piceous setae, epistoma hardly convex and centrally carinate longitudinally; clypeus centrally discreted at the base and apically depressed, subglabrous with a few long and coarse setae; mandibles curved with the apical teeth short, strongly obtuse and of equal length; palpi with the three apical joints cylindrical. Antennae nearly three quarters the length of the body, immaculate and gradually, slightly attenuate throughout towards the apex. Thorax dull and finely scabrous throughout; notauli obsolete; metanotum subdeplanate with the areola hardly indicated laterally; petiolar area short and scarcely declived; spiracles large and linear. Scutellum not prominent, black and punctate. Abdomen dull and finely reticulate throughout, black with the hardly elevated apices of the segments rarely narrowly and obscurely castaneous; spiracles of all segments strong and enclosed by an oblique impression; basal segment finely and closely punctate with no trace of carinae beyond the basal excavation; terebra two fifths of the abdomen. Legs black and somewhat stout with the front tibiae and, more obscurely, their femora internally fulvescent; claws stout and curved with no basal tooth. Wings distinctly infumate throughout; stigma, radix and tegulae black; arcolet triangular and sessile, emitting the recurrent nervure from beyond its centre; nervellus curved and strongly postfural, intercepting the recurrent nervure far above the centre. Length,  $13\frac{1}{2}$ —20 mm.

The ♂ differs from the above description in but a few unimportant particulars:—The basal segment is more strongly and elongately bicarinate centrally; the hind tibiae are usually dull piceous throughout; the intermediate are basally testaceous; the front legs have the tibiae, and the tarsi entirely, and the femora internally, testaceous and its wings are sometimes less deeply clouded.

The hind coxae of this species are much more densely and finely punctate than those of *P. instigator*, which it much resembles superficially, but the whole body is decidedly duller and more closely sculptured, the legs nearly entirely black and the wings clouded.

*P. aethiops* has not been described since Curtis and Gravenhorst brought it forward under distinct names, and then only in the female sex; there are six males and four females in the British Museum from which I have been enabled to draw the above adequate account of this hitherto little known species.

I am not yet satisfied that *P. aethiops* and *P. aterrima* are entirely synonymous. *P. aterrima* appears to be an intermediate form, since Taschenberg who examined Gravenhorst's types, says it "is like *P. examinator* in form and the proportion of the parts, but in sculpture resembles *P. instigator*, excepting that here the hind coxae are more densely punctate."

Gravenhorst described *P. aterrima* from a male and two females taken by Hope about Netley in Shropshire, a third female from Parma and a smaller one from Warmbrunn, in Silesia. I can find no subsequent records of it either here or abroad. One of the specimens of *P. aethiops* in the British Museum was bred from a chrysalis of *Papilio Machaon* by Desvignes, while three of the males and one female were raised from *Laelia caenosa*, both rare fen insects. Curtis originally described it as "bred from the pupa of *Arctia caenosa*." All these records and specimens are certainly antediluvian, i.e. were secured before the terribly destructive fen flood of 1848; and I have seen no more recent specimens.

28. *arctica*, Zett.

*Pimpla arctica*, Zett. I. L. 375, ♂; Holmgr. Sv. Ak. Handl. 1860, n. 10. p. 19; Thoms. O. E. xiii. 1408, ♂ ♀. *P. laponica*, Thoms. *lib. cit.* viii. 746 (*nec* Zett.). *P. spuria*, Schm. Zool. Jahrb. 1888, p. 477 (*nec* Grav.).

Head very short and strongly contracted behind the eyes; frons and face somewhat nitidulous, the former transversely subrugulose, the latter shallowly punctate; palpi piceous. Antennae long and slender; filiform. Thorax black; mesonotum shining, finely and shallowly punctate; mesopleurae finely and diffusely punctate, subrugose below; metathorax strongly rugose-punctate with the areola apically entire and laterally distinctly carinate; petiolar area basally rugose, apically nitidulous; metapleurae closely striate; spiracles elongate. Scutellum immaculate. Abdomen closely and coarsely punctate basally, more finely towards the nitidulous anus; tubercles obsolete; apices of the segments somewhat broadly elevated and nitidulous, the apical ones often narrowly pale; terebra half the length of the abdomen with the valvulae shortly pilose. Legs red with the coxae black; hind tibiae, often femora and the apices of the tarsi nigrescent, with the base of their tibiae usually narrowly pale-banded. Wings a little clouded with the fenestrae very distinct; stigma nigrescent with its base always pale; nervellus intercepting far above the centre. Length, 9—15 mm.

This species is very like *P. examiner* and especially its variety *strigipleuris*, but it is altogether stouter with the hind tibiae at most but narrowly pale-banded. It might well be mistaken for a dark legged form of *P. instigator*, from which the stronger puncturation of the whole body will distinguish it. Little reliance can be placed upon the pedal colouration, however, since this varies in the only two examples I possess. The conformation of the abdomen and very different mesosternal puncturation will at once distinguish it from *P. examiner*.

From *P. instigator* this species differs in having the face much more closely, in the centre confluent, punctate with short grey pilosity; palpi with only the two apical joints dull piceous; the scape more strongly punctate beneath; the mesopleurae not at all strigose; the scutellum finely punctate throughout; legs black with the anterior femora, tibiae and tarsi, especially beneath, more or less rufescent or stramineous; hind legs black with coxae strongly and subconfluent punctate, and at most the base of the femora ferrugineous; areolet externally subpellucid; internal cubital nervure less sinuate.

It is an essentially northern species, seldom met with in central Europe. With us there is but one record, by Harwood from Essex in the Victoria History of that county. It is, however, probably not rare with us; Mr. E. R. Banks bred a female at the beginning or August, 1904, from the pupa of some *Geometer*, whose larva he had found feeding on birch at Corfe Castle; it emerged through the extreme capital end of the chrysalis, which was entirely and irregularly excised. Mr. Blair has also kindly given it to me, together with the capital half of the pupa of *Orgyia antiqua* still containing many eggs, from which he had bred it in the New Forest on 18th Sept. 1905; he adds that "the pupa lies free within the partially cleared host's pupa." I have also seen a female captured by Mr. Evans at Comiston on 13th October, 1900.

[In a MS. table of this genus, drawn up by Bridgman and preserved in the Castle Museum at Norwich, *P. opacellata*, is placed between *P. calligata*, Voll. (Pinac. pl. xxi, fig. 8) and *P. illecebrator*, Rossi (Tasch. Zeits. Ges. Nat. 1863, p. 258), which two species are considered nowadays to be synonymous. *P. illecebrator* is distinguished by the length of its terebra, which is longer than half the abdomen and its range does not appear to extend as far north as our islands. That *P. aterrima* is distinct from *P. illecebrator*, however, I am extremely doubtful, especially since of the two examples of *P. arctica* noted by me above one has on the hind tibiae a somewhat obvious pale band, while in the second it is extremely obsolete and all but wanting, though the specimens are certainly of one species. It will be seen from Desvignes' description that nothing but the terebral length precludes it from *P. illecebrator*, if one regards the presence of the tibial band variable; the anterior tibiae are distinctly infusate externally in my specimens, which have the abdomen 8 and the terebra 3 mm. in length. It is most probably synonymous with *P. arctica*.

*PIMPLA OPACELLATA*, Desv.

Head transverse; face with griseous pilosity, parallel-sided; frons deplanate and excavate; antennae slender and a little shorter than the body. Thorax gibbulous and subcylindrical; metathorax strongly punctate. Abdomen finely punctate, black; basal segment dorsally explanate, deplanate and elevated; incisures very distinct and deeply impressed; the fifth segment narrow but transverse; terebra stout and one third the length of abdomen. Legs red with the coxae, trochanters, apices of the hind femora and whole of their tibiae and tarsi, black; anterior tibiae externally infusate. Wings not clouded; stigma and radix black, the former basally white; areolet oblique and sessile; all the nervures black. Length, 9 mm.

Desvignes described it from a single ♀ and says (*l.c.*) it belongs to Gravenhorst's sixth section of the genus, which has the thorax, abdomen and hind coxae black.

The type, which I have examined, was reared by Mr. Barrett of Haslemere from a pupa of *Psyche opacella* and is in the National Collection. Bridgman, who alone has noticed this species since it was first described, records it from Norwich, where it was captured by Wheeler.]

**29. *examinator*, Fab.**

*Ichneumon graminellae*, Schr. F. B. II, ii. 301, ♀ (?) (*nec* Grav. et Holmgr.). *Cryptus examinator*, Fab. Piez. 85, ♀. *Pimpla examinator*, Grav. I. E. iii. 207; Zett. I. L. 375; Ratz. Ichn. d. Forst. i. 116; ii. 93; iii. 99; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 19; Tasch. Zeits. Ges. Nat. 1863, pp. 52 et 262; Voll. Pinac. pl. ix. fig. 5, ♂ ♀; cf. Sichel, Ann. Soc. Fr. 1864, p. 687. Var. *P. bilineata*, Brullé, Hist. Nat. Ins. Hym. iv. 98, ♀; Lucas, Exp. Alg. iii. 323; Tosq. Ichn. Afr. 284, ♀. (?) *P. cheloniae*, Giraud, Ann. Soc. Fr. 1869, p. 149, ♂ ♀.

A somewhat smooth black species, with legs partly red and white, and the coxae black. Head immaculate, rounded behind the broadly and very slightly emarginate eyes; face convex and strongly punctate throughout; clypeus centrally depressed and apically margined; frons transaculate; palpi piceous, with the three apical joints of the ♂ stramineous. Antennae slender and nearly as long as the body; black throughout or apically ferruginous beneath; scape immaculate. Thorax of ♀, and sometimes of ♂, with a more or less obsolete line before the radix flavidous;

mesonotum evenly punctate and shining, with the notauli almost wanting; metathorax transversely aciculate-punctate with no areae, petiolar region glabrous and nitidulous, spiracles ovate and longer than broad; of ♂ with grey pilosity. Scutellum immaculate, subconvex, finely punctate throughout with griseous pilosity. Abdomen closely and evenly punctate and somewhat dull; of ♂ subcylindrical, longer and a little narrower than the head and thorax, of ♀ oblong ovate, nearly double length of and as broad as thorax; first segment basally scrobiculate and bicarinate; segments with all the apical margins nitidulous though hardly elevated and not laterally tuberculate, often apically castaneous; terebra setigerous, about half length of the abdomen. Legs red or fulvous, with coxae and trochanters black; anterior tibiae more or less pale-banded before their base; hind legs somewhat elongate, dead black with the femora except their extreme apices red, and a pure white band before the base of the tibiae; hind claws nigrescent, much longer than the pulvilli and apically curved, of ♀ not basally lobed. Wings somewhat clouded and broad; stigma and radius black or piceous, with base and apex of the former pale; radix and usually tegulae of ♂ stramineous, of ♀ ferrugineous and generally anteriorly white; areolet, sessile or subsessile; nervellus intercepting far above the centre. Length, 4—10 mm.

At once recognised by the oval metathoracic spiracles, slender and fili-form antennae, black coxae and basally white hind tibiae. The metathoracic sculpture is not quite constant though its apex is always subglabrous; the ♂ rarely has the hind tibiae rufescent before their apices and the basal pale band, usually pure white, is sometimes rufescent, as in *P. strigipleuris*, though in the present species the metapleurae are punctate throughout.

I have little doubt that *P. bilineata*, Brullé, is no more than a form of this species, having the metanotum centrally canaliculate throughout and the hind tibial pale band often obsolete in the ♀, though very distinct in the ♂, which has not hitherto been described: it differs from the ♀ in nothing but sexual characters. I possess four specimens of this variety, which has not before been noticed in Britain: (1 and 2) One of each sex bred, on 8th and 9th of August, 1896, from the pupae of *Tortrix* sp. whose larvae were found feeding on mountain ash at Corfe Castle, in Dorset, by Mr. E. R. Banks. (3) A ♀ bred in 1907 by Dr. McDougall at Edinburgh from the chrysalis of a plum-feeding *Tortrix* larva—probably *T. xylosteana*. (4) A ♂ bred on 26th July, 1902, from a chrysalis of *Nephopteryx genistella*, found by Banks in the Isle of Purbeck: this specimen emerged through an irregularly circular hole in the face of the pupa, before the capital extremity.

I have seen no females which I can assign to this species and, if not mixed with of those *P. turionellae*, they must be very rare. The males, on the contrary, are extremely abundant in Britain. They are generally taken from May 16th to the end of June flying about oak, hazel and birch bushes in woods, where they may also be swept from the low herbage, in the very hottest weather. They are rarely seen out of woods, though I have swept them in the open fen at Wicken, in Cambs. It, however, still occurs, though much more sparingly, through July up to August 29th. It is very little attracted by flowers, though rarely taken on whitethorn blossom in the spring and carrot flowers in the late summer. I have found it in Suffolk at Dunwich, Reydon, Bentley Woods, Brandon, Mildenhall, Assington Thicks, Monk Park Wood, and Eye; as well as at Norton Wood

and the Havenstreet Woods, in the Isle of Wight; Blean Woods, near Faversham; Gosfield in Essex; Hurst Hill, in the New Forest; and Felden, in Hertfordshire. I possess examples from Kings Cross, in Arran, in August (Dalglish); Barnstaple, Devon (Marshall); Greenings, in Surrey (W. Saunders); Halstead, Essex (Beaumont); Guestling, in Sussex (Bloomfield); Bury, Southwold and Tostock, Suffolk (Tuck); Taunton and Lynmouth in August, (Charbonnier); Wimbledon Common (Bedwell); Abinger Hammer, near Dorking (Butler); and Shere in Surrey (Capron). I have seen males from St. Issey in Cornwall (Davies); St. Albans (Gibbs); Queensferry, Lundine Wood near Dunfermline, Kirknewton and Loganlee in the Pentlands (Evans). It is recorded from the Lands End district (Marquand); as seen daily throughout the summer in Devon (Bignell); Norwich (Bridgman); from Scotland (Encycl. Brit. ix. 1842); and as bred by Bignell from *Tortrix viridana* and by Sang from *Ornix torquilella* (Entom. 1881, p. 141); by Gregson from *Trochilium scoliaeforme* (Buckler); as well as from *Cymalophora ocularis* and *Noctua plecta* (Marshall, Ent. Ann. 1874, p. 125).

On the Continent it has been very widely bred: by Gravenhorst from pupae of both *Tinea padella* and *Bombyx fuliginosa*; by Ratzeburg from *Bombyx processionea*, *B. chrysorrhoea*, *Lithosia quadra*, *Tortrix Buoliana*, *T. picana*, *T. quercana* and perhaps *T. prasinana*, as well as from *Bombyx monacha* and *Tinea evonymella* by Holmgren; Prof. Hering bred it (Stett. Zeit., Aug. 1847) from *Psyche Stettinensis*; Taschenburg adds *Psyche hirsutella*, *Harpygia vinula* and *Zerene grossulariata*; Brischke *Gastropacha neustria*, *G. trifolii*, *Cucullia argentea*, *Yponomeuta malinellus*, *Nephopteryx vacciniella*, *Pyralis* sp. and *Anthonomus pomorum*; Kirchner brings forward *Cucullia artemisiae* and *Fumica nitidella*; and Dr. Giraud (Ann. Soc. Fr. 1877, p. 409) *Psyche graminella*, *P. calvella*, and *Yponomeuta cognatella*; and his *Pimpla cheloniae* was bred by M. Fallou in France from *Chelonia cervini* (cf. loc. cit. et lib. cit. 1864, p. 687). *Pimpla graminellae* of Schrank is synonymised with this species by Schmiedeknecht because the latter has since been bred from Schrank's host (*Psyche graminella*) and he has himself often seen it flying in company with that moth.

### 30. turionellae, Linn.

*Ichneumon turionellae*, Linn. F.S. 404. *Cryptus turionellae*, Fab. Piez. 87. *Pimpla turionellae*, Gr. I.E. iii. 192; Zett. I.L. 376; Ratz. Ichn. d. Forst. i. 883; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 21; Tasch. Zeits. Ges. Nat. 1863, pp. 53 et 262; Thoms. O.E. viii. 747; xiii. 1408, ♂ ♀; cf. Voll. Pinac. pl. ix, fig. 7. Var. *P. strigipleuris*, Thoms. O.E. viii. 747; xiii. 1408; xix. 2125, ♂ ♀. Var. *P. flavicoxis*, Thoms. lib. cit. viii. 747; xiii. 1408, ♂ ♀.

A somewhat smooth black species, with the legs partly red and white, and the coxae red. Head short and transverse; frons concave, somewhat smooth; face punctate; frontal orbits immaculate; palpi of ♂ pale. Antennae slender, of ♀ sometimes entirely black but usually with the flagellum more or less ferrugineous beneath; of ♂ with the scape rarely flavidous beneath. Thorax stout; pleura shining, remotely and sub-obsoletely punctate; metathorax with the upper areae obsolete, the petiolar of ♀ sometimes basally carinate; spiracles ovate. Scutellum black, or more or less flavidous. Abdomen somewhat smooth; basal segment not dorsally carinate; the four basal segments distinctly and evenly punctate, hardly impressed laterally with the smooth apices nar-

rowly subcastaneous or testaceous; the seventh of the ♂ transverse and apically truncate, with its hypopygium exerted and apically constricted; terebra hardly half length of abdomen with the valvulae shortly pilose. Legs somewhat stout, red; the anterior with the coxae basally and tarsal claws nigrescent, and a paler band before the base of the tibiae; hind tibiae and tarsi infusate with a white band before the base of the former; apical joint of hind tarsi about double length of the penultimate, claws of ♀ not basally lobed. Wings more or less clouded; radix usually white, tegulae infusate or concolorous; stigma piceous with base pale; areolet irregular or subsessile; nervellus intercepting far above the centre. Length,  $4\frac{1}{2}$ —10 mm.

From my description of *P. examinator*, this species differs only and solely in the coxal colouration; Thomson says it may be known therefrom by the fenestrae of the second recurrent nervure being divided by a dot in place of a line, that the ♀ has the sixth and seventh flagellar joints more abruptly shorter, the ♂ face less convex with its puncturation finer and sparser—all of which points I utterly fail to follow; he adds that the ♀ has no preradical pale line (there is, however, usually a pale callosity) and the ♂ the basal segment more strongly elevated apically (which, though presumably a good structural feature, is, in reality, inconstant).

I possess ♂♂ of *P. examinator* with the tibial band as rufescent as that of *P. strigipleuris* (= *P. turionellae*, var. 2, Grav.); moreover the metapleurae of the present species are often strigose posteriorly in specimens with a pure white tibial band. Nor do I find that *P. flavicoxis* (= *P. turionellae*, var. 3, Grav.) differs in anything but the paler coxae, in ♀ the basally paler flagellum, in ♂ the flavidous scutellum, under side of the scape and rarely a concolorous pronotal callosity. The variation of the coxal colouration, so far from justifying the erection of distinct species, appears to me to lend probability to the synonymy of the older authors, Geoffroy, Olivier, etc., of *P. turionellae* with *P. examinator*. Gravenhorst describes a variety of *P. turionellae* (var. 1) with the anterior coxae and base of their trochanters black, and of *P. examinator* (var. 2) with the anterior legs nearly entirely flavescent (cf. also Brischke, Schr. Nat. Ges. Danz. 1880, p. 111 et Tosquinet, Ann. Soc. Belg. 1897, p. 285). Mr. Banks has kindly given me seven ♂♂ the colour of whose coxae ranges from entirely black in one individual to entirely castaneous in another; they were bred together with a couple of *Limnecrae* ♂♂, and a ♀ *Eubadizon extensor*, Linn., in the Isle of Purbeck, Dorset, June 28th to July 17th, 1902, from *Sericoris bifasciana*, Hw. Although the synonymy of these two species cannot yet be established, I have pointed out below how frequently they are associated on the wing; and it is also significant that I have never captured a ♀ with black coxae,\* though, as noticed under the last species, males so coloured are extremely frequent. *P. spuria*, Grav., considered as synonymous with this species by Marshall, is now treated as distinct by modern Continental authors. Between it and the present species there is a somewhat connecting form, which I will here describe as var. *RUFITIBIA* (nov.) of *P. turionellae*, from which it differs in having the hind tibiae and tarsi—excepting the white band—clear red in place of nigrescent, with at most the extreme base of the former infusate; it is not a common form and I have seen but four ♀♀:—One found by Mr. Esam about Hastings,

\* Since the above was written I have been delighted to find, in an odd box, a female with black coxae, taken by me on the flowers of *Aster tripolium* in the salt marshes at Southwold, on 28th September, 1900; this at least proves that both forms occur in Britain.

and three taken by myself at Claydon Bridge on flowers of *Angelica sylvestris* in September, at Barham Oak Wood on flowers of *Heracleum sphondylium* in the middle of July, and at Earlham, near Norwich, early in June. The last form of this species I shall mention is also undescribed:—I call it var. *RUFISTIGMA* (*nov.*), since it is instantly recognised by the pale testaceous stigma of the wings and in my three ♀♀, which were taken by Tuck at Bungay in Suffolk, Capron at Shere in Surrey, and Piffard at Felden in Herts., the size does not exceed 4 mm.; in fact, it appears to bear the same relationship to *P. turionellae* that the form *intermedia* does to *P. instigator*, being a small and debilitate race.

At Gosfield in Essex, I swept from grass in a park on 24th July, 1902, three typical ♂♂ *P. turionellae*, three ♂♂ of its var. *flavicoxis* and four ♂♂ *P. examiner*; in Wicken Fen, in June, 1902, I swept ♂♂ of both species; at Felden, in Herts., early in August, 1903, I took ♂♂ of *P. examiner*, *P. turionellae* and its var. *flavicoxis*, flying together along hedgerows; from oaks at Brandon on the evening of June 5th, 1903, I beat ♂♂ *P. examiner* side by side with ♀♀ *P. turionellae*; in August, 1900, Butler took ♂♂ *P. examiner*, ♂♂ *P. turionellae* var. *flavicoxis* and typical ♀♀ of the latter at Abinger Hammer; on 29th of the same month I took ♂ *P. examiner* and ♀ *P. turionellae* side by side on flowers in the marshes at Eye, in Suffolk; lastly as illustrating a very common observation, ♂♂ of *P. examiner* and ♀♀ of *P. turionellae* were flying together, both very commonly, on 20th June, 1907, in a grassy path through Norton Wood, in the Isle of Wight.

I possess males of the var. *flavicoxis*, with the scutellum varying from the apical half bright flavous to the extreme apex obsoletely badius, taken at Lyndhurst (Adams), Shere in Surrey (Capron), Greenings in Surrey (W. Saunders), Lewisham in Kent (Beaumont), and Tostock in Suffolk (Tuck). And females of the var. *strigipleuris* from Lymington Saltens in June, beneath seaweed\*; Tostock and Aldeburgh, in September (Tuck); Shere (Capron); Kilmore, in Ireland, in August (Beaumont); New Forest (Miss Chawner); Deal, in 1907 (Donisthorpe); and Cambuslang, in Lanark, in June (Dalglish).

This species is abundant everywhere, more particularly in woody places from the middle of May to the end of August; I have frequently beaten the males from birch and hazel, found the female sitting on maple and bracken stems, as well as upon the flowers of *Angelica*, *Heracleum* and wild carrot. Lyndhurst, Brockenhurst, Matley Bog and Pond Head Wood, in the New Forest; Assington, Brandon, Bury St. Edmunds, Wherstead, Bramford, Bentley Woods, Benacre Broad, Tostock, Ampton, Timworth, and Foxhall, in Suffolk; Greenings, Shere and Mayford, in Surrey; Colwyn, Lewisham, Marsh Mills, Spring Vale in the Isle of Wight, Lymington Town, West Runton in Norfolk, Ely, and Chippenham Fen in Cambs., Felden, Guestling, Hastings, Carlisle, Solihull near Birmingham, Kirkby and South Leverton in Notts., Selby in Yorks., St. Issey in Cornwall, Ramsey in the Isle of Man, Guernsey; and in Scotland from Braemar (Elliott), Irvine Moor (Dalglish), Dumbarton in September (Malloch), Raith in Fife, Currie, Dirleton and Lwenhall near Mussel-

\* It was here associated with *Pogonus chalcus*, *Homalota halobryetha*, *Quedius molochinus*, *Casius xantholoma*, *Agriotes sordidus*, *Cassida vittata* and *Anthicus salinus*; but it more probably had preyed upon some coast Lepidopteron, since Bridgman records twenty ♀♀ and one ♂ (which latter has all the coxae black!) as bred by Fletcher at Worthing from *Depressaria heracliana* in September, 1883. These specimens were doubtfully referred to *P. spuria*, Grav. (Entom. 1883, p. 251) and certainly to the present variety (*l.c.* 1884, p. 69—*cf.* also Trans. Ent. Soc. 1884, p. 433).



burgh, Queensferry, and Polton near Edinburgh (Evans). It is not commonly bred; I have seen two females, one of which emerged from the chrysalis of *Oporabia dilutata* from near Reigate in the spring of 1899, the larva of which Prideaux had found during the preceding October; the second emerged on 1st May, 1899, from the chrysalis of some Geometer, which had been dug at the base of an oak at High Wycombe, Bucks., by Peachell; both emerged from the capital extremity of the pupae, which was entirely excised, very nearly in the centre and within the pupae were somewhat regularly spun round with a thin layer of whitish strands.

It is recorded as bred by Linnaeus from *Phalaena turionella*; by Scharfenberg from *Bombyx pini*; from which Ratzeburg also raised it, together with *Tortrix Buoliana*; and by Kirchner from *Cosmia diffinis*. Common in Norfolk, and bred from *Tortrix costana* and *Eupacilia ambiguana* (Bridgman); bred in July from *Rhodophaea consociella* and in the middle of October from *Xylopora fabriciana*, in Devon (Bignell); Netley, in Shropshire (Grav.); Lastingham, in Yorks (Marshall); Holgate, near York (Bairstow); Lands End (Marquand); Armagh, in Ireland (Johnson); bred from *Tenthredo instabilis*, Kl. (Ent. Ann. 1874, p. 125); abundant among fir trees at Glanvilles Wootton (Dale); and bred by Bower from *Hemerophila abruptaria* (Buckler).

### 31. *maculator*, Fab.

*Ichneumon maculator*, Fab. S. E. 337. *I. scanicus*, Vill. Linn. Ent. iii. 190. *Cryptus maculator*, Fab. Piez. 87. *Pimpla scanica*, Gr. I. E. iii. 204; Zett. I. L. 375; Ratz. Ichn. d. Forst. i. 116 et ii. 93; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 21; Tasch. Zeits. Ges. Nat. 1863, pp. 57 et 264; Brisch. Schr. Nat. Ges. Danz. 1880, p. 111, excl. varr.; Thoms. O. E. 748 et 1408, ♂ & ♀; Voll. Pinac. pl. ix, fig. 6, ♀. *P. tricolor*, Ratz. Ichn. d. Forst. iii. 100. *P. maculator*, Kriech. Ent. Nachr. 1887, p. 116; Schm. Zool. Jahrb. 1888, p. 489. (?) *Ichneumon plaesseus*, Fourc. E. P. 417.

A dull black species with elongate thoracic pilosity and tricoloured tibiae. Head immaculate, short, transverse and a little narrowed behind the eyes; face distinctly pilose and, especially centrally, closely punctate; frons deplanate, closely punctate and not centrally canaliculate; vertex narrow and laterally pubescent; palpi white or stramineous. Antennae filiform and somewhat incrassate towards the apices, nearly as long as the body, ferruginous or testaceous with the joints apically darker, beneath paler with the discally black scape flavous. Thorax gibbulous with long recumbent flavo-griseous pilosity, obscuring puncturation, and a pale callosity before the radix; mesonotum closely and subconfluently punctate, with very obsolete notauli; the pleurae strongly nitidulous between the fine punctures; metathorax centrally glabrous throughout with the areola basally subcostate and parallel-sided, apically explanate and convergent with the petiolar area; spiracles small and quite circular. Scutellum black, subdeplanate, obsoletely punctate throughout with griseous pilosity. Abdomen evenly and somewhat strongly punctate; of ♂ hardly deplanate, double length of head and thorax, hardly narrower than the latter and cylindrical with the incisures subtestaceous; of ♀ subdeplanate, fully as long as the head and thorax and subcylindrical; apices of the segments elevated, shining, red or castaneous with the lateral margins always red; basal segment laterally margined, apically testaceous in the centre, with the base excavate and carinate to the centre; terebra half or one-third the

length of abdomen. Legs somewhat stout; the anterior with coxae and trochanters black and usually flavous beneath, tibiae and tarsi flavidous with a paler band before base of the former; posterior tarsi white with the apices of the joints nigrescent; hind coxae and trochanters black or badious usually with the apices of the latter flavous, their femora always fulvous, tibiae black with a white band before the base and a red band before the apex; hind tarsi with the apical joint thrice longer than the penultimate and the claws simple, not basally lobate. Wings normal and usually slightly clouded; stigma piceous with base paler, radix and tegulae concolourous or stramineous; areolet irregular, subsessile; nervellus intercepting far above the centre. Length,  $4\frac{1}{2}$ —9 mm.

It is at once recognised by the elongate, flavidous, recumbent mesonotal pubescence, tricoloured tibiae and laterally rufescent abdomen. It somewhat resembles *P. turionellae* in the outline of the body, but the stouter and apically subclavate antennae, and the colour of the stouter legs will distinguish it.

The dense thoracic pubescence is a perfectly satisfactory character and it may be instantly known by it from all other species of the genus; the tibiae are very rarely without red colouration in their apical half and the lateral rufescence of the abdomen is variable in extent, though always present on at least the apical angles of the posterior segments. I have noted no other variation in my hundred specimens, and am sure those of Brischke must relate to some other species.

The name *maculator* is now in general use on the Continent for this species, which has been so long known as *scanica*; I have not seen Fabricius' original description, but in his *Piezata* (1804) he certainly inadequately describes it: "*Cryptus niger abdominis lateribus pedibusque rufis*," making no mention of a white tibial band, as is the case in *P. turionellae*, immediately following it: one does not like to give up old friends without a struggle! Thomson ascribes the name *scanica* to Linneus.

This species is associated in my mind with fir-woods in the early spring. From 1894 to 1904 I beat it annually, though more abundantly in some years, from *Pinus sylvestris*, *Taxus baccata* and *Picea excelsa* in the Bentley Woods, near Ipswich, from the 1st February to the end of April, when it appeared to desert the pines; when fallen into the umbrella it feigns death, contracts its antennae and legs, and lies motionless, closely resembling the surrounding fir-needles. During May the females are found on hawthorn, birch, etc. I have not met with it in June, but in July both sexes have been very sparingly seen on flowers of *Heracleum sphondylium*; and in the early autumn on those of Angelica, wild carrot and *Cnicus palustris*. The male is not found later than 24th September. In October the females, which alone hibernate, are again seeking Coniferae, though whether they pass the winter in the foliage or beneath the bark is unknown; one, flying round a yew-tree in a Ryde garden on 10th October, lived fourteen days in a pill box. Piffard has taken the female as late as November 15th, so it is doubtful if there be any quiescent hibernation in its stricter sense. Miss Chawner has bred a male—by far the rarer sex with us—at Burley, Hants., from some ? *Tortrix* chrysalis on a hazel leaf: the parasitic larva appears to have broken through the host's chrysalis and has spun for itself a cocoon of white, semitransparent, papyraceous texture, exceeding in length the chrysalis (parts of which adhere externally) by one millimetre, its total length reaching ten millimetres and that of the emerged parasite seven millimetres.

It is very common throughout Europe and extends to northern Africa. It has been bred by Ratzeburg from pupae of *Tortrix viridana*, *T. chlorana*, *T. piceana* in August, *T. laevigana* in June, *T. pruniana*, *Bombyx neustria*, *Tinea padella*, from a *Psyche case* and perhaps from *Tinea acerifoliella*; by Taschenburg from *Coleophora tiliella*; by Giraud from *Hyponomeuta cognatella*, *Psyche calvella*, *Grapholitha tripunctana* and *Nematus salicis*; Brischke further gives as hosts *Psyche nitidella*, *Laverna epilobiella*, *Depressaria intermediella*, *Nephopteryx vacciniella*, a spiders' nest and bred hyperparasitically from a *Tortrix* larva through a *Microgaster* cocoon. In Britain it has been bred from *Gonepteryx rhamni* (Buckler); from *Tortrix viridana*, *Argyresthia nitidella*, *Gracillaria stigmatella* (Entom. 1881, p. 141); *Eurymene dolabraria*, *Endopisa leplastriana*, *Lithocolletis cavella* (l.c. 1884, p. 68); at the end of June from *Tortrix ribeana* in Devon (Bignell), and from both *Noctua brunnea* and several females from pupa of *Odonestis potatoria* (Proc. S. Lond. Soc. 1896, pp. 84-5). Common in Norfolk (Bridgman), very common at Gunthwaite, Holgate, Storthes Woods, Grimescar and Lavingham, in Yorks (Bairstow), Essex (Harwood) Hastings (Butterfield), Birmingham (Bradley), Rye House and Hunstanton (Brunetti), Dargavel and Bonhill (Mallock), Langham Herring, amongst firs early in May (Richardson), Worksop (Houghton), Ripley and Woking (Morice), Theddlethorpe in Lincs (Gibbs), Ampton in Suffolk (Nurse), Braidburn, Dirleton and on spruce in April near Gifford in Haddington (Evans), Brockenhurst (Cross), Lyndhurst (Adams), Tostock (Tuck), Dorking (Butler), Delamere Forest (Tomlin), Blackheath (Beaumont), Shere (Capron), Deal sandhills (Sladen), Greenings (W. Saunders), Horfield near Bristol and Lynmouth (Charbonnier), Cadney in Lincs (Peacock), Poolthorn and Manton Common in north Lincs (Thornley), Felden (Piffard), Pollokshields and Johnstone in Scotland (Dalglish). I have taken specimens at Barnby Broad, Brandon, Foxhall, Dodnash, Southwold, Covehithe Broad, Easton Broad and Depden, and swept the female in the Bramford marshes in October, in Suffolk; at Hollington near Hastings and Matley Bog in the New Forest.

### 32. *alternans*, Grav.

*Pimpla alternans*, Gr. I. E. iii. 201; Ratz. Ichn. d. Forst. ii. 92; Tasch. Zeits. Ges. Nat. 1863, p. 56; Schm. Zool. Jahrb. 1888, p. 491, ♂ ♀; cf. Voll. Pinac. pl. ix, fig 8 et Kriech. Ent. Nachr. 1887, p. 116. *P. trincta*, Thoms. O. E. viii. 748 et xiii. 1408, ♂ ♀.

A dull black species with short, obsolete thoracic pilosity and tricoloured tibiae. Length, 5—10 mm.

Instantly known from the last-described species, which it exactly resembles, by the short, somewhat sparse and subsetigerous mesonotal pilosity and the entirely black abdomen; the colour of the legs is also usually, though not always different. Thomson evidently co-mingled his *P. trincta* with *P. maculator*, since he says the ♀ of the former may be known by the red colouration before the black apices of the hind tibiae, which is (as I have shown) a nearly constant character of the latter. Kriechbaumer says "whereas in *P. maculator* the colour of the stigma appears infuscate-piceous with the base and apex pale, it is in *P. alternans* piceo-griseous with dark brown thickened front and hind margins;" but, although often present, the paler stigma is not constant. Schmiedeknecht followed Gravenhorst and Thomson in noting the distinction of the thoracic pube-

scence, which appears to be constant, since not one of the several hundred specimens of *P. maculator* taken by me in the Bentley pine woods possessed it; he capture many ♂♂ and one ♀ flying on the margin of an oak wood, where the leaves were just appearing early in May, 1886, at Schönberg near Gumperda. I have not taken it before July, though it has been bred with us in May, and I have found the ♀♀ at Southwold in salt-marshes mixed with both sexes of *P. maculator*. That is a distinct species, however, is I consider proved by Bankes' and Chapman's breeding.

There are two forms of this species, of equal frequency in Britain, differing only in their circular and oval metathoracic spiracles: the latter I shall term var. *spiracularis* (nov.); it shows transition to *P. ovalis*, Thoms., but the legs are tricoloured.

On the Continent this species is said to be as common and widely distributed as *P. maculator*, with which the following hosts are doubtless much mixed. It was bred by Reissig at the end of April from *Cynips terminalis* and by Ratzeburg nearly certainly from *Orchestes quercus* in Germany; by Brischke in Prussia from *Femusa pumila*, *Abraaxas grossulariata* through *Limneria tricolor*, *Lophyrus pini* and *Cidaria juniperata*; Giraud raised it in France from *Saperda populnea* and *Coleophora Giraudi*; and it is also said to prey upon *Selandria bipunctata*, *Nematus viminalis*, *N. salicis*, the Cecidomyid *Asphondylia genistae*, *Oenophyra pilleriana*, *Elachista sapor-tella* and a species of *Gelechia*. There are no British records, since it has hitherto been regarded as synonymous with the last species with us, though in reality not very uncommon, especially in September. The Rev. A. Thornley has bred two females from the cocoons of *Zygaena filipendulae* in Yorkshire. Mr. E. R. Bankes bred four females between the end of April and the middle of May, 1905, from *Clepsis rusticana*, Tr., in the Isle of Purbeck, Dorset; together with a large female *Limneria*, like *Omorga cursitans*, Holmgr.\* I bred one female from a *Tortrix* chrysalis in a saw leaf at Barnby Broad, which emerged on 11th August, 1898, through a circular hole exactly at the capital extremity; I have also taken it on blackthorn in the Bentley Woods in September, and both sexes on windows of Monks' Soham House in July; Tuck has sent it me from Aldeburgh, Newbery from Hendon in July, Charbonnier from Taunton in August and Bristol in July, W. Saunders from Greenings in Surrey and Butler several males from Abinger Hammer in the same county. The var. *spiracularis* is, perhaps, more widely distributed with us; Dr. Cassal has bred it near Doncaster from a *Tortrix* chrysalis in a curled birch leaf; Rev. C. D. Ash from *Coleophora curcippennella* at Doncaster on 30th June,

\* On 8th August, 1902, Dr. Chapman sent me for names from Bejar, in Spain, several specimens of *P. alternans*, differing from the British form only in the red abdomen, of which the base of the segments alone is more or less broadly black (var. *decora*). Four ♀♀ had emerged from *Pioneer instalis*: five ♀♀ and four ♂♂ from *Heterogynis paradoxa*, Rmbr., and two ♀♀ which he said emerged from cocoons of the Ophionid *Casinaria orbitalis*, Grav., one of which he opened and found "the ichneumon pupa in some fluid which was the remains of *C. orbitalis*" (in lit.); he added that he was quite positive he had bred the *Pimpla* from the *Casinaria* cocoons, and thought the former entirely indifferent as to whether it fed direct on the Lepidopterous larva or on a parasite previously in possession. He expatiates (Trans. Ent. Soc. 1902, p. 728): "Many male or apparently male cocoons were collected at Piedrahita, of which some 95 per cent. produced ichneumons. These were of two species. One spins an oval cocoon within that of the *Heterogynis*, after emerging from the larva of its host, and produces *C. orbitalis*. In the case of the other, the *Heterogynis* either changes to pupa or appears to die as a larva, in both cases *Pimpla scanica*, Vill." (recte *P. alternans*, var. *decora*), "emerges, by cutting out a lid in the dead skin of its host. In two instances at least a *Pimpla* emerged from a cocoon of the *Casinaria*. As hyperparasitism is not recorded for *Pimpla* (I believe)" (cf. Brischke's record of *Limneria tricolor*, supra) "and as the present species is a simple direct parasite on the *Heterogynis*, the hyperparasitism must here be accidental; the larva of *Pimpla*, finding its host occupied also by a larva of *Casinaria orbitalis*, solved the awkward situation by entering the body of its fellow-guest, as it must have been within the *Casinaria* when that spun its cocoon," &c.

1900; and Porritt, who has found it in the Wharncliffe Woods, has also bred it in Yorkshire; Piffard has taken it at Felden, Charbonnier at Bristol, Tomlin in the Bentley Woods, Capron at Shere, Adams at Lyndhurst, Tuck at Tostock; and I have noticed it at Assington in May, Aldeburgh, Brandon, females swept from reeds at Southwold and one on an ivy leaf at Belstead, in Suffolk, as late as 29th October, which points to hibernation. Dours records it (Hym. France, 14) as parasitic upon *Nematus intercus* in galls on willow.

### 33. *epeirae*, Bignell.

*Pimpla epeirae*, Bignell, E. M. M. 1893, p. 37, ♀.

Black. Head smooth and immaculate. Antennae as long as the abdomen; flagellum 22-jointed, ferrugineous throughout beneath. Mesonotum nitidulous, obsoletely punctate and pilose; metanotum more strongly punctate and centrally bicarinate. Scutellum black and obsoletely punctate. Abdomen nearly double length of head and thorax deeply punctate; basal segment as long as its apical breadth; the four following only half as long as broad, remainder constricted to the anus; second and third segments partly ferrugineous, second to fifth with their apical third elevated and nitidulous; terebra nearly as long (2 mm.) as the thorax. Legs ferrugineous with the apices of the hind tibiae and of their tarsal joints, with all the onychii, infuscate. Wings 13 mm. in expanse; the piceous stigma basally whitish; areolet pentagonal, not broader than long; about half the outer cubital recurrent nervure and two portions of the exterior discoidal recurrent pellucid. Length, 7—8 mm.

I have a ♂ ♀, which must certainly be referred to this species; the ♂ has unfortunately lost its head and front legs: the female palpi are testaceous and the piceous clypeus is apically not emarginate; the nervellus in both sexes is slightly postfurcal and intercepting hardly above the centre; the metathoracic spiracles are very small and quite circular, the notauli obsolete, the flagellum subattenuate towards its base, the cheeks very short, all the coxae black, the second to fourth (or in ♂ fifth) segments bright brick-red with their apices black and distinct, transversely broad lateral tubercles. It is certainly a good and distinct species, differing from all other *Itopectes* in its very distinct abdominal tubercles and strongly elevated segmental apices, in colour related perhaps to Förster's name *nefasta*. The colour of the abdomen is, however, very variable: one of the original females, lent me by its author, is entirely black.

Bignell described this species from four females, one of which is in the British Museum, bred on 7th July, 1891, from their own light yellow, ten-millimetres-long and four-broad cocoons, which formed a compact mass within the egg-bag of a spider, *Epeira cornuta*, obtained in June at Ivy-bridge, in south Devon. My pair were bred by Miss Chawner from a "spider's nest, Burley, July," in the New Forest; and the cocoons, which are very pale yellow, surrounded by pale green curling threads, are interwoven upon one another.

### 34. *curticauda*, Kriech.

*Pimpla curticauda*, Kriech. Ent. Nachr. 1887, p. 120; Schm. Zool. Jahrb. 1888, p. 488; Strobl. Mitt. Nat. Ver. St. 1901, p. 10, ♀; Schm. Opusc. Ichn. 1069, ♂ ♀. *P. clavicornis*, Thoms. O.E. xiii. 1409, ♀.

A black species with subclavate antennae and sharply banded hind tibiae and tarsi. Head short, almost broader than the thorax, strongly

narrowed behind the unusually emarginate eyes; vertex narrow and smooth; frons smooth, hardly broader than the obsoletely punctate face and impressed above the scrobes; cheeks very short, mandibles piceous; clypeus broadly depressed and not apically emarginate; palpi pale. Antennae apically subclavate, somewhat elongate, with scape and pedicellus black; flagellum stramineous beneath with the joints apically infusate. Thorax shining and very finely pubescent with a fulvous callosity before the radix; mesonotum shining and extremely finely punctate, notauli wanting in ♀, finely impressed in ♂; mesosternum subglabrous; metanotum shining, basally hardly punctate, more distinctly though sparsely and finely laterally; areola somewhat broad, laterally distinct, apically incomplete and deplanate; petiolar region not costate; spiracles small, rotund-oval. Scutellum immaculate, Abdomen parallel-sided, constricted at base and apex, somewhat flat; segments longitudinally subrugose, incisures deeply impressed, central tubercles and lateral impressions inconspicuous; basal segment not short, postpetiole longer than broad; ♂ ventral valvulae distinctly exerted; terebra slender, straight and hardly as long as the basal segment. Legs stout, fulvous with the base of the front, and small spots on the posterior coxae, and apices of the femora, black; hind tibiae and tarsi black, former white-banded before the base, latter with the four first joints basally white; calcaria concolorous. Wings not clouded; nervures and stigma infusate, the latter narrow and centrally paler with a basal white spot, or with stigma broad and testaceous; tegulae pale; areolet subpentagonal, sessile; nervellus strongly postfurcal and intercepting far above the centre. Length, 6—11 mm.

These two species have not before been regarded as synonymous, but I consider that little doubt can be entertained upon the point: the only distinctions I can trace after placing the original descriptions of both side by side is that Kriechbaumer terms the antennae filiform with the flagellum ferrugineous beneath, whereas in *P. clavicornis* they are distinctly explanate towards the apices and stramineous below; the former describes the stigma as infusate and narrow, whereas Thomson gives it as testaceous and somewhat broad, but in my ♀ it is clear testaceous and in the ♂ ♂ infusate, and of normal breadth in both sexes; Thomson does not refer to the longitudinal coalescence of the abdominal puncturation, which is distinct in my ♂ ♂ but wanting in the ♀; the latter also gives many points entirely ignored by Kriechbaumer, and his description is so excellent as to leave not the smallest doubt regarding its application to the British examples, which differ from both very slightly: the ♂ ♂ in having all the coxae black, with the stigma and tegulae piceous and the ♀ in having the anterior coxae red, the hind ones entirely black, the stigma testaceous, with the tegulae and apical margin of the frenum bright stramineous. It will be seen from the above description of both sexes how little the ♂, which has not been before adequately described and is merely referred to in Opusc. Ichn., differs from the ♀.

Kriechbaumer's species is said to bear as much affinity to *Apechthis* as to *Itoplectis*; and this is the strongest reason, perhaps, for considering it distinct from *P. clavicornis*, which is most undoubtedly a member of the latter subgenus, as placed by Thomson, and the specimens in my collection appear to agree with *I. despecta*, Först., though no mention is made of the very peculiar ♀ frenum, an organ so rarely presenting any modification as to be almost unknown in descriptions.

One female was taken by Kriechbaumer at the end of June near Munich, Schmiedeknecht records three analogous ones from Thuringia and it is very rare in Central Europe; Thomson's species was captured near Helsingborg, in Sweden. I possess one female and two males from Britain, whence it has not hitherto been recorded; the former was taken by Dr. Capron, probably about Shere, in Surrey, and of the latter one was swept from heather at Selby in Yorks. by Rev. C. D. Ash on 17th September, 1902, and the other found at Braemar on 10th August, 1907, by E. A. Elliott, F.Z.S.

### 35. brassicariae, Poda.

*Ichneumon brassicariae*, Poda, Ins. Graec. 105; cf. Rogenh. Verh. z-b. Ges. 1881, p. 597. *I. varicornis*, Fab. E.S. ii. 180. *Pimpla varicornis*, Fab. Piez. 119; Gr. I.E. iii. 167; Zett. I.L. 375; Ratz. Ichn. d. Forst. i. 117; Holmgr. Sv. Ak. Hand. 1854, p. 87; Tasch. Zeits. Ges. Nat. 1863, pp. 54 et 263, ♂ ♀. *P. rufata*, var. 1, Gr. I.E. iii. 166; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 20; Thoms. O. E. xiii. 1411, ♂ ♀; cf. Voll. Pinac. pl. ix, fig. 4 et *P. ousata* (sic), O. E. viii. 749.

Head short and transverse, narrowed behind the large and internally deeply emarginate eyes; face subquadrate, sparsely punctate and sub-elevated longitudinally in the centre; cheeks short, frons unequally impressed and smooth, clypeus depressed; palpi piceous or testaceous with the joints apically infuscate; ♀ occasionally with the internal orbits narrowly ferrugineous or flavous; ♂ with mouth except apices of mandibles, clypeus and more or less of the face, though sometimes only the internal orbits, flavous. Antennae filiform, somewhat stout and not apically attenuate, shorter than the body, ferrugineous and paler beneath with the joints apically darker and the scape, except usually in ♀, flavous. Thorax stout, gibbulous, black; of ♂ sometimes with two mesonotal vittae and a callosity beneath the radix flavous; pleura smooth and sparsely punctate; metathorax strongly punctate with the supracoxal and petiolar areas smoother and more sparsely punctate; spiracles oval. Scutellum apically usually flavescent or fulvous; postscutellum at least laterally flavous. Abdomen with the three or four basal segments strongly punctate; of ♀ double length of head and thorax, of ♂ longer, subfusiform-cylindrical; basal segment deeply canaliculate to apex, basally excavate, centrally strongly bicarinate and elevated; second basally foveate on either side; margin of segments slightly elevated and somewhat nitidulous, rarely badius, with obsolete lateral impressions; seventh of ♂ longer than broad, apically constricted and the hypopygium somewhat elongately acuminate; terebra subcompressed, a quarter the length of the abdomen with the valvulae black, pilose, subclavate and spicula rufescent. Legs normal, fulvous or red; front ones partly flavidous with their coxae at least basally nigrescent; hind tibiae ferrugineous or fulvous with the base infuscate and sometimes a subobsolete whitish band before it, their tarsi entirely rufescent or infuscate with the first joint basally paler; tarsi stout and in ♀ basally lobate. Wings normal, subflavescent; stigma and radius nigrescent, radix stramineous and tegulae black or pale; areolet subregular, sessile or subpetiolate; nervellus intercepting above centre. Length, 7—14 mm.

Very like *P. rufata*, but with the markings of the whole body and structure of the basal segment, which is canaliculate to the apex, different; from *P. angens*, it may be known by the oval metathoracic spiracles and the deeply impressed fovea on either side of the second segment (Holmgren). Both sexes differ from *P. rufata* in the tibiae having no determinate white band and the basal segment with centrally elevated carinae; the ♀ in all the claws dentate, orbits immaculate or rarely the frontal and a dot at the vertical pale, the mesonotum with no pale vittae, tegulae generally black, scutellum with a transverse flavo-citrinous mark or rarely immaculate, basal metanotal area short and apically explanate, anterior coxae basally black; the ♂ in the partly black face with the frontal and a dot at the vertical orbits pale, mesonotum with no humeral and rarely two discal lines pale, and the seventh segment closely and strongly punctate (Thomson).

Extremely closely allied to the next-described species (*q.v.*)

Gravenhorst, who first recorded it from Britain and noticed it in Germany as late as October, represents the larva of this species hibernating in the chrysalis of *Bombyx libatrix*: it became a pupa on 23rd April and emerged on 8th May; he adds that Scopoli bred it from pupae of *Papilio crataegi* and *Noctua brassicaria* and Scharfenberg from *Papilio crataegi* and *P. poly-chloros*. Rösel also raised it from the pupa of *Aporia crataegi* and Ratzeburg from those of *Bombyx monacha*, *Botys verticalis* and both sexes in August from a *Tenthredo* larva. Taschenberg, who seems to have considerably mixed the older records of this and the next species (followed by Schmiedeknecht and Tosquinet), adds *Papilio brassicae*, *Limenitis camilla* and *Liparis salicis* to its hosts; and Giraud also bred it from *Pieris brassicae*, *Aporia crataegi* and *Neptis lucilla*.

It is recorded in Britain from Bickleigh in Devon, as late as the middle of September (Bignell); Norfolk (Bridgman); York (Wilson, Yorks. Nat. 1881, p. 153); Huddersfield and Scarborough (Trans. Yorks. N.U. 1882, p. 108); Ely, not rare in 1833 (Jenyns); Essex (Harwood) and Hastings (Vict. Hist. Sussex). I have seen it from Copdock in Suffolk, taken by Hocking; Bunny, near Nottingham, bred in 1898 from *Thecla w-album*, by Prof. Carr; Retford and Treswell Woods in Notts. and Cadney in Lincs., taken by Thornley; Shere, in Surrey, by Capron; Felden, in Herts., by Piffard; Bewdley, by W. Ellis; New Forest, by Miss Chawner; Lynmouth, by Charbonnier; Brockenhurst, by Cross; and Bury St. Edmunds, by Tuck.

Mr. E. Shaw has given me a specimen bred at Worcester from a pupa of *Vanessa c-album*, kept in a cold cellar, in February, 1903; and I have another bred in the New Forest from a *Tortrix* chrysalis, which emerged almost from the extreme capital end, though a little to one side of it. It is, perhaps, a slightly commoner form than the next species, but I have rarely met with it: at Henley and Monks' Soham, in Suffolk, on house-windows in June and July, and at Denny Wood in the New Forest, in the middle of August. It ranges throughout Europe and is nowhere uncommon. A male of this species, upon the strength of which Marshall erroneously brought forward *P. ovivora* as British (Ent. Ann. 1874, p. 125), is still in his collection, minus its head, in the British Museum, under that name and is labelled "from (*Cymatophora*) *flavicornis*."



36. *rufata*, Gmel.

*Ichneumon rufatus*, Gmel. S.N. i. 2684. *Pimpla rufata*, Gr. I.E. iii. 164, excl. var. 1; Ratz. Ichn. d. Forst. i. 118 et iii. 101; Holmgr. Sv. Ak. Handl. 1854, p. 87; Tasch. Zeits. Ges. Nat. 1863, pp. 54 et 263, ♂ ♀; cf. Kriech. Ent. Nachr. 1887, p. 117. *P. flavonotata*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 19; Thoms. O.E. viii. 749 et xiii. 1411, ♂ ♀; Voll. Pinac. pl. ix, fig. 3, ♀.

A smooth species with legs mainly red and mesonotum bilineated with flavous. Head short, transverse and narrowed behind the large and internally deeply emarginate eyes; face subquadrate, sparsely punctate, and centrally subelevated longitudinally; cheeks short; frons unequally impressed and somewhat smooth; clypeus depressed; ♂ with mouth, clypeus, face and the frontal orbits flavous; ♀ with palpi and generally the internal and external orbits narrowly flavous. Antennae filiform, somewhat stout and not apically attenuate, infusate and more or less broadly testaceous beneath, with the joints apically darker; scape of ♂ flavous, of ♀ generally testaceous, beneath. Thorax stout and gibbulous with an elongate line before and another beneath the radix, and two discal vittae, flavous; ♂ often with two pectoral marks testaceous; pleurae smooth and sparsely punctate; metathorax somewhat strongly punctate with the supracoxal and petiolar areae smoother and more sparsely punctate; spiracles oval. Scutellum apically and the postscutellum flavous. Abdomen double length of head and thorax and as broad as the latter, cylindrical with the three or four basal segments strongly punctate; basal segment obsoletely bicarinate with the intervening space not deeply canaliculate, basally excavate and a little elevated from centre to apex; second foveate on either side; apical margins of segments slightly elevated, more nitidulous and rarely badius, with obsolete lateral impressions; seventh of ♂ longer than broad, apically constricted and the hypopygium somewhat strongly acuminate; terebra a quarter the length of the abdomen, compressed and pilose with the spicula badius. Legs normal, red or fulvous with the anterior mainly flavidous; posterior tibiae broadly white-banded before their infusate base, tarsi infusate with the basal joint paler, or in ♂ all the joints basally whitish; tarsal claws stout and in ♀ distinctly explanate-dentate basally. Wings flavescent or hyaline; stigma and radius piceous, radix and tegulae flavous or in ♀ ferrugineous; areolet subregular, subsessile; nervellus intercepting above centre. Length, 7—14 mm.

This species is very variable in size and closely resembles *P. brassicariae*, but the basal segment is centrally much less elevated, its carinae obsolete with the intervening space not apically excavate, and the hind tibiae are always white at their basal third (Holmgren). Both sexes differ from *P. brassicariae*, in the determinately white hind tibial band and not centrally elevated carinae of the basal segment; the ♀ in having the orbits and vertical dots flavous, the humeral and discal mesonotal lines, a quadrate apical scutellar and transverse postscutellar marks and their lateral carinae pale, the basal metanotal area parallel-sided, anterior legs not basally black and the tegulae with callosities before and below them generally pale; the ♂ in the entirely pale face and broad frontal and vertical marks, confluent pale discal and humeral mesonotal lines, and the seventh segment discally deeply punctate and laterally sinuate.

I do not myself believe that this species and the last are distinct since the basal segment, though often more deeply canaliculate, varies as much

in conformation as does that of *P. turionellæ*; I do not find that the extent of the flavous capital and thoracic, nor of white pedal, decoration at all coincides with the modifications of the petiolar carinae, and consequently I can place no reliance upon it. I tentatively arrange all those specimens with the basal segment more deeply canaliculate under *P. brassicariæ* and those with the apex of the basal segment subdeplanate under the present species, which must fall if their synonymy come to be established. As to the published records, they must be taken *cum grano salis*; it is sufficient to know that they belong to one or other of these species, which are equally common with a co-extensive range throughout Europe from Scandinavia to Italy, from May to October.

The present species is recorded as bred on the Continent by Gravenhorst from *Phalaena grossulariata*; by Holmgren from *Thecla quercus*; by Drewsen (Wieg. Arch. ii, p. 38) from *Papilio urticae*; by Boie (*l.c.* p. 40) from *Sphinx ligustri*; by Ratzeburg from *Zerene grossulariata*, *Liparis monacha*, *Tortrix viridana*, *T. laevigana*, *Tinea populella*, and the cocoon of *Lophyrus ? pini*; by Brischke from pupae of *Gastropacha neustria*, *Drepna falcula*, *Psyche viciella*, *Nephopteryx vacciniella*, *Acidalia trilinearia*, *Spilosoma menthastri*, *Rhodocera rhamni* and *Pieris rapae*; by Perris (Ann. Soc. Fr. 1877, p. 410) from *Ephyra sp.* and *Tortrix viridana*; and Taschenberg's mention of *Pimpla varicornis* "aus Eiern der Kreuzspinne" is probably taken from Bouché, who says (Naturg. 145) that the larva of *P. rufata* has been found during the winter in the nests of *Aranca diadema*, whose eggs it devours; he adds that they change to pupae in papyraceous, white, elliptic and somewhat flattened cocoons, which are arranged side by side to the number of ten or fifteen inside the spider's egg-sac and the imagines emerge during the following spring. I should suspect some error of identification in this spinning of a free cocoon by a species well known to pupate within its lepidopterous host's chrysalis but Giraud (Ann. Soc. Fr. 1877, p. 410) also states that he has bred it from a "nid d'Araignée en boule verte."

In Britain it has also been bred from *Tortrix viridana* at Birmingham by Martineau; and in South Devon by Bignell (Entom. 1881, p. 141), who has further raised it from both *Vanessa c-album* and *Ennomos tiliaria* (Entom. 1883, p. 67); and *Platypteryx lacertinaria* (Buckler). It is recorded from Brundall and Norwich by Bridgman, and Essex by Harwood; I have seen it from Birmingham (Bradley), Weymouth (Richardson), Kings Lynn (Atmore), Hastings (Butterfield), and Mr. S. Edwards found it commonly at Lynton in Devon in 1890. I possess examples taken at Ely by Cross in July, New Forest as early as 18th May by Adams, Tresswell Wood in Notts. by Thornley, Crindle in Londonderry by Wilson Saunders, Shere by Capron; and have myself caught it flying along hedges at Felden in Herts, where Piffard has also seen it, swept it from reeds in the salt-marshes at Southwold, beaten it from birch bushes in Assington Thicks in Suffolk, and taken it about Ipswich. I have not, however, met with it later than the first week in August; and there appear to be no records from Scotland. Both sexes were commonly seen in my garden at Monks' Soham at the beginning of last June, between 3 and 5 p.m., searching the leaves of shrubs and sucking the flowers of *Vicia cracca*; they flew up, in every instance, with the southerly wind and continued their investigations in a northerly direction.

### 37. *oculatoria*, *Fab.*

*Ichneumon oculatorius*, Fab. E.S. Suppl. 221. *Cryptus oculatorius*, Fab. Piez. 78. *Pimpla oculatoria*, Gr. I.E. iii. 154; Holmgr. Sv. Ak. Handl. 1854, p. 89; et 1860, n. 10, p. 26; Tasch. Zeits. Ges. Nat. 1863, pp. 61 et 264; Thoms. O.E. viii. 751 et xiii. 1412; Schm. Zool. Jahrb. 1888, p. 498, ♂ ♀; Voll. Pinac. xxi, fig. 7, ♂.

A slender shining species, with red thorax and tuberculate abdomen. Head black and strongly narrowed behind the emarginate eyes; of ♂ with mouth, face and frontal, as well as sometimes external, orbits flavous; of ♀ with palpi, all the orbits, mandibles except apically, clypeus and often two facial dots flavous, and the face often mainly rufescent; clypeus convex and apically neither depressed nor emarginate; cheeks very short. Antennae filiform, longer than half the body, fulvous with the four or five basal joints black above; scape of ♂ flavous beneath. Thorax gibbulous, shining, black with fine, superficial punctation and sparse pubescence; propleurae flavous; mesothorax red with lines before and below the radix, often two longitudinal discal vittae and in ♂ pectoral and pleural marks, flavous; notauli distinct to the centre; two very constant dots before the apex of the metathorax flavous, and marks on the metapleurae sometimes red; metathorax evenly and somewhat strongly punctate and pilose with only obsolete traces of areola; spiracles quite circular. Scutellum red with its sides, apex and the postscutellum flavous. Abdomen slender, deeply punctate with interstices glabrous and nitidulous, colour variable; of ♂ cylindrical, thrice longer and a little narrower than the thorax; of ♀ somewhat shorter, as broad as thorax, subcylindrical and a little constricted at base and apex; segments of ♀ quadrate and of ♂ elongate, usually black with a rosy band before their apices, often extending laterally and rarely occupying the whole abdomen; seventh and often sixth segments entirely red; all transversely impressed at their apical third and distinctly tuberculate laterally; terebra a third or a quarter the length of the abdomen, valvulae black and pilose, spicula red or stramineous. Legs somewhat slender, pale stramineous-fulvous with apices of the tarsal joints infusate; the anterior legs, especially in ♂, paler; hind coxae and trochanters variegated, and the tibiae pale with their extreme apices and a band before the base infusate; apical tarsal joint fully double length of the penultimate, claws small and in ♀ basally lobate. Wings normal, subhyaline; stigma always pale testaceous; radix and tegulae flavous; areolet irregular, subsessile or petiolate with its outer nervure pellucid at base and apex; nervellus strongly postfurcal and intercepting hardly above the centre. Length, 7—10 mm.

Holmgren says this species is very similar to *P. ovivorax*, but may be known by the broadly rufescent thoracic markings; it is certainly closely allied to the genus *Polysphincta* in its slender form, short ovipositor, red marking and incomplete areolet.

I can find no details of this species' ecdysis, though it has for so long been known to devour spiders' eggs. Gravenhorst gives the fullest account amounting to the facts that two ♂♂ and one ♀ were bred on the 18th March from the egg-bag of some uninstanced spider, taken among grass during the preceding autumn; their larvae had destroyed nearly all the eggs and undergone their whole metamorphoses in the nest, referred to by Westwood, Mod. Class. ii. 143 et Laboulbène, Ann. Soc. Fr. 1858,

p. 800).\* Giraud alone identifies this species' pabulum as the eggs of *Epeira diademata*, in France; and Brischke bred it from spiders' nests in Prussia. At a meeting of the Ent. Soc. Lond. on 2nd April, 1866, Mr. W. Rogers exhibited specimens of this ichneumon, bred by him from the egg-bag of a spider found under loose bark of an oak-fence; Smith and Desvignes both said that they also had bred the species but always from bramble-sticks; if it were not for Bignell's record of this species from the same situation, I should suspect confusion in the latter's statement with *Perithous*.

The Revd O. Pickard-Cambridge has given me two females of this species, together with the egg-bag of *Epeira diademata*, from which they emerged on 6th May, 1903. On opening the bag, I found four soft, pure white, cottony cocoons of very fine, thin and close texture, lying immediately between the outer covering of the bag and the yellow egg-fluff, though so interwoven upon the latter as to be inextricable. Mixed with this fluff were about fifty little spiders, which had certainly emerged before the *Pimplae* had completed their cocoons since one, with no trace of its egg, was found inside one of the latter. The remainder of the contents of the cocoons consisted of several very distinct exuviae and the crumpled larva-skin, protruding from which I was delighted to recognize the very distinctive rostrum of the below-described larva. All the four cocoons were evacuated: a third female had failed to emerge and was lying just beneath the outer covering of the bag, but the fourth had evidently made an unobserved exit and could not be found.

On the 19th November, 1899, I found an egg-bag of the same species of spider under the coping of a garden wall in Ipswich, which contained an ichneumonidous larva of most unusual form and colour. Soon after it had



Life-size  $\frac{1}{2}$  in.

cast one of its skins (I do not know if it casts more than one), on the 14th of the following March I examined it. It was dull ochre in colour with nigrescent markings (as depicted); the curiously elongate head was somewhat paler with a darker longitudinal central line; the eyes were dark, distinctly prominent and, in some lights, sanguineous; just beyond them is a pair of minute ? antennae and, near the apex of the rostrum another pair of setae (? palpi); the apex of the rostrum appears to be furnished with a tubular mouth, bearing no mandibles and is, in some lights, sanguineous. The markings probably represent the alimentary canal and muscles, since exuviae are quite visible before being ejected. Above the apices of the posterior segments are somewhat elevated, doubtless as locomotive organs, since the larva possesses neither feet nor setae. The underside is similarly marked, though a little paler and much smoother. The head is somewhat obliquely bicarinate below and the second segment apically emarginate, giving the former freer motion. The body is capable of only vertical flexibility and, on a piece of paper, a very slight propulsion only is shown by means of the oral sucker. Its length then was  $5\frac{1}{2}$  mm., though perhaps not fully grown. The skin from which it had but shortly emerged had almost identical markings; it had split down *one side* as far as the third segment only,

\* cf. also Laboulbène, Ann. Soc. Fr. 1871, p. 444, "Note sur les Moeurs de la *Pimpla oculatoria* et sur les Ravages qu'elle peut produire dans les nids d'Araignées," in which he recounts how the larvae devoured nearly all the eggs of *Epeira diadema* and eventually produced six females, but no males, of this ichneumon.

showing that the capital extremity had been withdrawn *en masse*. This larva, the only one in the bag, unfortunately died; and many young spiders emerged from the bag on May 13th. It was not till I examined the above bag from Mr. Pickard-Cambridge that I was able to guess what my larva had been; and the connection is, of course even now unsatisfactory, though extremely probably correct.

This species is probably common enough if sought in its peculiar pabulum, but is rarer towards southern Europe. I have only once met with the imago myself, while beating *Taxus baccata* in the Bentley pine woods in the middle of April; but it is evidently widely distributed, since it is recorded from Huddersfield (Bairstow); as bred in May from old bramble stem in Devon and taken at Bickleigh in July (Bignell); from Earlham, in Norfolk (Bridgman); Essex (Harwood); Pevensy and Hastings (Vict. Hist.); from Swaffham Bulbeck and Wicken Fen, in Cambs. (Vict. Hist.); Malvern, in August (Beaumont); Langton Herring, in September (Richardson); Gelt, near Carlisle, in June (Day); Kings Lynn (Atmore); Lynton, at the end of October, 1899 (Elliott); New Forest (Miss Chawner); Felden, in Herts (Piffard); Tostock, early in September (Tuck); Shere (Capron); Treswell Wood, Notts., early in September (Thornley); Poyntzpass, in Armagh, among spiders' nests on furze-bushes, in April (Johnson, E.M.M. 1907, p. 100); Brockenhurst in May (Cross).

### 38. *ornata*, Grav.

*Pimpla ornata*, Gr. I.E. iii. 158; Tasch. Zeits. Ges. Nat. 1863, p. 265, ♀; Thoms. O.E. viii. 752 et xiii. 1412; Brisch. Schr. Nat. Ges. Danz. 1880, p. 113; Schm. Zool. Jahrb. 1888, p. 499, ♂ ♀. *P. semivaria*, Kriech. An. Soc. Esp. 1894, p. 247, ♀.

Head somewhat distinctly narrowed behind the eyes, black with the palpi, clypeus and usually the internal and vertical orbits, red or stramineous; of ♂ with the whole face also flavous. Antennae infusate, ferruginous or red beneath, with the scape sometimes entirely nigrescent. Thorax subpilose and not very shining; mesonotum and most of the mesopleurae red or castaneous, the latter sometimes obsoletely and the former at others, especially in ♂, only discally pale; a line below, and an elongate one before, the radix flavous; metathorax coarsely punctate, areola subconcave with its apical costae wanting and the lateral ones weak. Scutellum and postscutellum flavous; disc of the former in ♀ more or less broadly red. Abdomen closely and somewhat coarsely punctate, with large glabrous lateral tubercles and the segmental apices elevated and nitidulous; of ♀ with the segments broader than long, basal of ♂ elongate and the third quadrate; basal segment punctate throughout, with the apical angles distinctly reflexed; terebra fully half length of the abdomen, with spicula badius. Legs red; the posterior with their tibiae and tarsal joints subinfusate, basally testaceous with the tibiae broadly concolourous centrally; claws of ♀ basally lobate. Wings hardly clouded, stigma and radius black, radix and tegulae stramineous; areolet irregular, subsessile and often externally obsolete; nervellus intercepting slightly above the centre. Length, 6—8 mm.

The ♀ is evidently a very variable insect as regards colour: Gravenhorst gives a variety with the orbits only narrowly flavous, which he says is closely allied to his *P. angens* (*ovivora*, Boh.), and in my ♀ ♀ the frons

is entirely immaculate; the mesonotum has sometimes only two red discal vittae, as described by Thomson; the scutellum is occasionally black; and Brischke draws attention to a form of both sexes with entirely black thorax, and the posterior tibiae of the ♂ not pale at their base.

This species, which has hitherto been mixed in Britain with *P. oculatorio* and is not recorded hence, is said to occur uncommonly in Sweden and Germany, rarely in Belgium in August, and Brischke tells us he has bred it from *Gastropacha neustria* in Prussia. With us it is certainly commonest in September, when Tuck has sent me three females from Tostock and Finborough Park, in Suffolk, and Butler another from Abinger Hammer, near Dorking; the former has met with a male at Tostock in June and I took an example of the same sex at Horning Ferry, in the Norfolk Broads on the 15th of that month in 1901; a second at Finningham in Suffolk on 3rd, 1903; as well as a female in Wicken Village, in Cambs., at the same time of year, all by sweeping. Beaumont took it at Malvern at the end of August, 1898.

### 39. *ovivora*, Boh.

*Pimpla ovivora*, Boh. Sv. Ak. Handl. 1821, p. 336, excl. ♂, pl. iv, figg. 1 et 2; Holmgr. lib. cit. 1860, n. 10, p. 26; Voll. Pinac. pl. xxi, figg. 6, 6; Brisch. Schr. Nat. Ges. Danz. 1880, p. 113; Schm. Zool. Jahrb. 1888, p. 495, ♂ ♀. *P. angens*, Gr. I.E. iii. 162 (part.); ? Ratz. Ich. d. Forst. iii. 101, ♂; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 22; Tasch. Zeits. Ges. Nat. 1863, pp. 60 et 265; Thoms. O.E. viii. 752 et xiii. 1412; Schm. Opusc. Ich. 1074, ♂ ♀. Var. *P. parallela*, Thoms. O.E. 748 et 1409, ♀.

A slender black species with white inner orbits, scutellum and hind tibiae. Head narrowed behind the large and subprominent eyes; face subglabrous and narrower than the smooth and shining frons; palpi, clypeus, in ♂ face and in both sexes the internal orbits to the vertex, pale stramineous; clypeus apically depressed and slightly emarginate. Antennae filiform, much longer than half the body and not apically attenuate, rufescent beneath and in ♂ basally paler. Thorax black with only humeral lines and others beneath the radices pale stramineous; mesonotum strongly nitidulous, extremely finely punctate with fine grey pilosity; mesosternum in type form more or less broadly red; metathorax sparsely and not very deeply punctate and pilose with weak and parallel lateral areolar costae; spiracles circular. Scutellum black with its apex, and the postscutellum, pale stramineous. Abdomen parallel-sided, slender and cylindrical, somewhat strongly punctate, black throughout; basal segment hardly longer than broad with its basal excavation alone carinate; segments apically smooth and distinctly tuberculate laterally; terebra slender and somewhat shorter than half the abdomen. Legs normal and not stout, red with the anterior of the ♂ pale stramineous and coxae of both sexes rarely badius; hind tibiae white with their apices and a band before the base ferrugineous-nigrescent, their tarsi black with the joints basally white; ♀ with the hind trochanters often infusate, their tarsal claws very small and basally lobate with the apical joint double length of the penultimate. Wings normal, hyaline, with the stigma piceous and and tegulae pale stramineous; areolet subtriangular and hardly sessile with its outer nervure pellucid at base and apex; radial nervure externally straight though a little sinuate before the inflexed apex; nervellus not very strongly postfurcal, intercepting a very little above the centre. Length, 6—10 mm.

The ♀ var. *parallela* is said to be smaller with the terebra slightly longer, the radius not apically sinuate and the legs more rufescent. It was described from a single damaged specimen, found in Sweden in 1877, and no one seems to have since found it.

This species has exactly the peculiarly slender and sveltdt outline of *P. oculatoria* but its metathorax is less, and the whole abdomen more, closely and strongly punctate, the notauli are less deeply impressed, the metanotum with the hind tibial bands and the external orbits are black, the stigma darker and the nervellus less distinctly postfurcal. *P. ornata* may be distinguished from the present species by its coarsely punctate metathorax with the areola distinct, slightly depressed, apically incomplete and laterally obsoletely costate, besides its red mesonotum and scutellum (cf. *P. rufipleura*, p. 61).

Brischke, followed by Schmeideknecht in 1888, differentiated *P. ovivora* from *P. angens* by the entire or partly red mesosternum, but in 1906 the latter certainly correctly unites them, though under the latter name, remarking, "Zu *P. angens* gehört auch zum Teil *P. ovivora*, Boh. Der letztere Name würde die Priorität haben, allein die Art ist eine Mischart." But if even that in his opinion invalidate its claim, *P. angens* of Gravenhorst is hardly in better plight! If both sexes of Boheman's species were bred together their synonymy is extremely probable.

This cannot be the *P. ovivora* of Walckenaer, since he says (Hist. Nat. Ins. apt. 1. 175) of some very small species, "*P. ovivora* and *P. arachniter* pierce with their invisible ovipositors the soft pellicle of the spiders' eggs and, without rupturing them, introduce their own eggs into the liquid. A winged insect eventually emerges from the egg, a phenomenon which has induced naturalists to believe that spiders could produce four-winged flies. . . . This is also what made Aristotle think that spiders' eggs produced little worms (Hist. An. viii, cap. 27)." Some *Proctotrypid* is here referred to.

It is extremely improbable that Ratzeburg's male was that of the present species, since he says Brischke bred it early in August from larvae of *Nematus septentrionalis* and cocoons of *Lophyrus ? frutetorum*, although the three bred by Jacobi from their own cocoons in a spider's nest at the end of July are probably correctly here placed, which is more than can be said of those recorded by him from *Geometra alniaria* and perhaps *G. tiliaria* early in October (iii. 258). This species is not infrequent on spiders' eggs in Scandinavia, Boheman originally bred seven specimens from a single nest; and Brischke bred it from yellow, petiolate spiders' nests on cranberry in Prussia. It is rare in Germany, where Taschenberg raised it from the eggs of an *Epeira* and of another spider, and is found in the autumn and late summer in damp and shady places, frequently among alder bushes. Giraud also bred it in France from spiders' nests and Tosquinet found it in several Belgian localities from May to September. *P. ovivora* figured in our 1870 "Catalogus"; but *P. angens* was first introduced by Rev. T. A. Marshall in Ent. Ann. 1874, p. 144, on the strength of a single female sent to him from Northumberland by Mr. Bold. There is not a single subsequent British record except the erroneous one by Marshall, from *Cymatophora flavicornis* (Ent. Ann. 1874, p. 125); but I possess two beautiful females in Dr. Edward Capron's collection, doubtless taken in the neighbourhood of Shere in Surrey, about 1880.

40. *Bridgmani*, Bignell.

*Pimpla Bridgmani*, Bignell, E. M. M. 1894, p. 255; Trans. Devon. Nat. Hist. Soc. 1894, ♀.

Head black, subcubical and somewhat rounded behind the subentire eyes; vertex nearly glabrous and distinctly bordered basally; frons glabrous and not centrally canaliculate; face strongly contracted to mouth and sparsely grey haired; with the palpi and two marks immediately below the scrobes alone pale. Antennae twenty-jointed, pale piceous and exactly filiform throughout; scape stramineous beneath with the pedicellus nearly as large as the scape proper. Thorax narrow, castaneous with the pleurae, sternum, and disc of the meso- and meta-thoraces centrally, testaceous; mesonotum somewhat elongately pilose with the notauli very deeply impressed, coalescent and nearly reaching the base; metanotum glabrous and distinctly canaliculate longitudinally in the centre; petiolar area hardly declived, basally obsolete and apically bordered; spiracles circular. Scutellum and postscutellum flavous, subconvex and not small. Abdomen testaceous-piceous, subglabrous, parallel-sided and not broader than the thorax; first segment not basally excavate, centrally subcanaliculate and aciculate; following laterally tuberculate before the slightly elevated apices; terebra one-fourth the length of the abdomen. Legs testaceous with all the apical tarsal joints, apices of the hind femora and tibiae, the latter also before their subconstricted base and the apices of all the hind tarsal joints, infuscate; front femora and tibiae not arcuate; hind tarsi with the three apical joints hardly longer than broad and the pulvilli very large. Wings hyaline with all the nervures and the stigma luteous; basal abscissa of the radius hardly longer than half the apical; areolet with the exterior nervure at least centrally distinct; nervellus sinuate and intercepting distinctly below the centre. Length, 5 mm.

By the courtesy of Mr. Bignell I have been enabled to draw up the above more detailed description of this species from the unique female in his collection; to me it appears to be much more closely related to *Acrodactyla* than to *Pimpla*, but the at least centrally distinct external nervure of the areolet excludes it from the former genus, and it must, at all events for the present, be placed here. It is a very slender species and the colouration gives rise to some doubt as to its maturity, especially since the apical flagellar joints are shrunken and ill-formed.

It was bred in south Devonshire from a spider, *Drassus lapidicolens*, Walck., and is at present quite unknown elsewhere.

Since the above was written I have discovered in my collection what is undoubtedly a male specimen of this species, since it agrees with it in every particular except in its entirely white face and frontal orbits, and rather more distinctly punctate abdomen. It has quite the same immature appearance as the female, though the abdomen is a little darker, with its ventral valvulae exerted. Its length is 4 mm. It was captured by Dr. Capron, presumably at Shere, in Surrey, about 1880.

POLYSPHINCTA, *Gravenhorst*.

Gr. I. E. iii (1829). 112.

Head shortly transverse, usually nitidulous, not buccate, but generally distinctly narrowed posteriorly; frons flat and slightly impressed above the antennae; eyes prominent and oval, more or less emarginate next the antennae; face subprotuberant and narrower than the frons, a little con-



stricted towards the mouth; cheeks short and not at all buccate; clypeus discreted, convex, apically broadly rounded and usually finely margined though not impressed; mandibles somewhat narrow and gradually dilated basally, with the lower tooth usually somewhat the shorter; maxillary palpi subelongate with the three apical joints subequal in length. Antennae short or of normal length, slender, filiform though slightly attenuate apically; scape apically nearly entire or a little excised externally at the apex; basal flagellar joint somewhat elongate, cylindrical and the apical one conical, sometimes double the length of the penultimate. Thorax gibbulous, longer than high and narrower than the head; pleurae smooth and nitidulous; epomia distinct; mesonotum ovate with distinct apical notauli; metathorax with the areae complete, obsolete or wanting; areola sometimes finely delineated, petiolar area very small and often entire; spiracles circular and minute. Scutellum subquadrate or subtriangular, apically obtuse and a little convex. Abdomen sessile or rarely subsessile, as broad as and twice longer than the thorax, oblong or cylindrical; epipleurae subobsolete; basal segment either subquadrate or a little longer than broad, rarely basally subconstricted, more or less distinctly bicarinate and transversely impressed before the apex with the tubercles near the base, segments two to four or five transversely impressed and tuberculate with the elevations nitidulous, and more or less punctate; the sixth and seventh of ♀ with the venter longitudinally cleft; terebra normally or shortly exerted, never longer than the abdomen and rarely longer than its half, spicula strongly acuminate with the valvulae pilose. Legs normal or slender, with the femora somewhat stout; apical joint of the hind tarsi usually dilated, longer and broader than the penultimate, with the claws stout and in ♀ basally lobate; the hind tibiae longer than their femora, with short and subequally long calcaria. Wings normal or ample; areolet wanting or obsolete, never entire; radial cell subanceolate; nervellus either slightly curved and not intercepted or distinctly bent and emitting a more or less distinct nervure.

The genus was originally distinguished from *Pimpla*, which it resembles in all superficial facies, by the lack of the areolet, which in *Pimpla pictipes* is said to be minute and nearly obsolete. Holmgren found, however, that, although it resembled *Pimpla* in the abdominal conformation, the terebra was as a rule shorter, and the clypeus, besides being more convex, was not or very rarely deflexed, never impressed though very often margined before its apex. It differs from *Schizopyga* in its more slender legs and longer terebra; and from *Clistopyga* the ♀ is distinct in the cleft hypopygium. Little or no reliance is to be placed upon the extent of rufescent thoracic, nor nigrescent pedal, coloration in this genus.

The species of this genus appear to be almost\* or quite exclusively ectoparasites of the Arachnida and several very interesting and economi-

\*It is mainly in Ratzeburg's "Forstinsekten" that the exceptions occur. He bred a very remarkable number of hymenopterous parasites, but the association was not always as satisfactorily established as one could wish, and in the case of species first described by him there is the additional danger that he may have not referred them to their correct genus—by no means a simple task in those days (1844-52). For instance, his *P. elegans* is synonymous with *Clistopyga incitator*, Fab., and, since it was bred out of beech logs together with his *P. soror*, various *Anobis* and *Philiini*, it is not impossible that the latter may also be extragenetic. His *P. areolaris* is probably the ♂ of some Tryphonid, since it was bred in August from three species of sawfly: from the cocoons of *Trichocampus viminalis*, Fall. in May, from *Crocus septentrionalis*, Linn., and *Pontania salicis*, Christ. His *P. latistriata* appears, from the figure of the wing (ii. pl. i, fig. 21) to be a true ♂ of this genus, but it is said to have been bred from the epidermal bladders of *Orchestes quercus* (cf. Trans. Ent. Soc. 1907, p. 49). *P. velata*, Htg., was raised by its author from the larvae of *Geometra pinivaria* (Jahresb. 1838, p. 262). Ratzeburg's *P. ribesii*, bred from *Pteronix ribesii* by Brischke, and his *P. lignicola*, thought to have been parasitic on some *Cerambyx*, are still less satisfactorily included in the present genus as insufficiently described or doubtful, by Schmiedeknecht, who makes no mention of the last. Brischke says he has bred *P. carbonata* from a sawfly, *Nematus ventricosus*, which Fitch suggests is an error.

cally important notices have been published respecting their development. Some of these do not specify the insect referred to and must, consequently, be treated generically. In spite of what Ratzeburg says to the contrary, we may I think, assume that it is invariably the spiders themselves, and not their eggs or their webs, which are attacked by *Polysphinctæ*.

DeGeer relates the history of an ichneumon emerging from a small parasitic white larva, which he had seen sucking the body of a spider, spinning a geometrical web; the latter died in consequence of its attack and the larva spun for itself an oblong, elongate white cocoon of fine silk in the centre of the spider's web, from which eight days later emerged a small black ichneumon with filiform antennae, yellow legs and two yellowish thoracic lines (Mém. ii. 863; pl. xxx, figg. 1-3).

Dilwynn actually witnessed the oviposition—a circumstance rarely recorded:—"I have frequently observed a small black species of ichneumon successively deposit an egg on the abdomen of two or more spiders on the sandhills near Swansea; and I doubt whether the spider had in any case arrived at its maturity. On one of these occasions I perfectly recollect having seen a young brood of dark-coloured spiders on Cromlyn burrows, and that when the ichneumon hovered over them they appeared alarmed, and instinctively endeavoured to escape" (Swansea Coleoptera, 27.)

Walckenaer took a specimen of a spider, *Linyphia montana*, Clerck, (which I have captured in Suffolk), sitting on its nest in the Pyrenees and says that it had "une larve blanchâtre pareille à une petite chenille le long de son dos. L'abdomen de l'Araignée avait une ligne et quart de longueur et la larve deux tiers de ligne." He gives an inadequate description of the parasite, of which he knew nothing and, indeed, thought might be a chrysalis (Hist. Nat. Ins. aptères. ii, pp. 176 et 233).

Another unspecified larva of *Polysphincta* is mentioned by Blackwall (Ann. Nat. Hist. 1843, pp. 1 et seqq) on an adult female of his *Leptyphantes minutus*, discovered on 26th October, 1841. It differed in its size from those of *P. carbonata* described earlier in the same paper; but, although it destroyed the spider, it failed to attain maturity, after spinning its own cocoon on 1st February, 1842.

Prof. Westwood exhibited "an ichneumon and an *Epeira*, the larva of the former being an external parasite on the body of the spider" at a Meeting of the Ent. Soc. Lond. on 4th January, 1869.

*Polysphincta boops*, Tschek, a central European species, has been bred from *Epeira diademata*, Clerck; and one of its larvae, about three millimetres in length, was found on July 25th, 1875, on the back of the abdomen of a *Theridion* spider about three miles from Dantzic. By the next day it had doubled its size and was shining white with red spots, and the spider was lying dead on the earth. The larva then gradually became whiter in colour till on the 27th it spun a thin, transparent, white and oblong cocoon, wherein it later turned to a yellowish pupa. Fourteen days after the spider's death, on August 9th, a male *P. boops* emerged (Deut. Ent. Zeit. 1877, p. 285). Brischke, who made the above observation, bred the male of another Continental species, *P. rufipes*, Grav., which is not unlikely to occur with us, from *Epeira diademata* at Königsberg.\*

\*It is interesting to note the, I believe unpublished, fact that Arachnid ectoparasites are also found among the *Chalcididae*: Rev. O. Pickard-Cambridge tells me that he has bred the beautiful little *Encyrtus sylvis*, Dalm., which has been bred from a coccid in Prussia, from the somewhat large salticid spider, *Aeluropus v-insignitus*, Clerck, in Dorsetshire. It certainly passed its whole larval existence attached to the outside of the spider's abdomen, until the moment of the imago's emergence.

*Table of Species.*

- |       |   |                                |
|-------|---|--------------------------------|
| (2).  | 1. Nervellus strongly postfurcal ; submarginal nervure distinct | 1. VARIIPES, <i>Grav.</i>      |
| (1).  | 2. Nervellus not postfurcal ; submarginal nervure very short.   |                                |
| (12). | 3. Nervellus intercepted below the centre.                      |                                |
| (5).  | 4. Segments three to five smooth                                | 2. SUBRUFA, <i>Bridg.</i>      |
| (4).  | 5. Segments three to five impressed before apex.                |                                |
| (11). | 6. Mesonotum nitidulous and subglabrous.                        |                                |
| (10). | 7. Metanotal sulcus and abdominal tubercles distinct.           |                                |
| (9).  | 8. Abdominal tubercles circular . . . . .                       | 3. TUBEROSA, <i>Grav.</i>      |
| (8).  | 9. Abdominal tubercles subtransverse . .                        | 4. MULTICOLORA, <i>Grav.</i>   |
| (7).  | 10. Metanotal sulcus and abdominal tubercles obsolete . . . . . | 5. CARBONATA, <i>Grav.</i>     |
| (6).  | 11. Mesonotum dull and subcoriaceous . .                        | 6. BOHEMANI, <i>Holmgr.</i>    |
| (3).  | 12. Nervellus entirely wanting.                                 |                                |
| (14). | 13. Femora stout ; terebra one-sixth of abdomen . . . . .       | 7. PERCONTATORIA, <i>Müll.</i> |
| (13). | 14. Femora slender ; terebra one-eighth of abdomen . . . . .    | 8. GRACILIS, <i>Holmgr.</i>    |

1. *variipes*, *Grav.*

*Polysphincta variipes*, Gr. I.E. iii. 117, excl. ♀ ; Holmgr. Sv. Ak. Handl. 1854, p. 90, ♀ ; *lib. cit.* 1860, n. 10, p. 29 ; *Tasch. Zeits. Ges. Nat.* 1863, p. 271, ♂ ♀ ; *cf.* *Brisch. Schr. Nat. Ges. Danz.* 1880, p. 114 *et* *Thoms. O.E.* xii. 1250. *Zaglyptus variipes*, *Schm. Zool. Jahr.* 1888, p. 433.

Black and somewhat shining, with the abdomen usually broadly red. Head distinctly constricted behind the eyes ; clypeus a little depressed apically ; palpi pale flavous. Antennae dull testaceous beneath ; ♂ with the sixth to eighth flagellar joints somewhat dilated externally. Thorax immaculate ; metanotum with its posterior angles obtusely dentate and its disc not sulcate, of ♀ nitidulous, sparsely punctate with the petiolar area basally trituberculate, of ♂ finely scabriculous with the tubercles smaller. Abdomen alutaceo-punctate, hardly shining and usually red or ferruginous centrally, of ♂ cylindrical and of ♀ elongate-ovate ; basal segment short and not longer than the hind coxae, with a broad and deep basal fovea, but no dorsal carinae ; segments two to five strongly punctate with their apices glabrous, and transversely incised before the apices, with the lateral tubercles inconspicuous and indeterminate ; terebra only a little shorter than the abdomen, with pilose valvulae. Legs stout and pale red, with the coxae more or less basally black ; hind tibiae externally and their tarsi dull ferruginous, the former with a band before the base and the latter with their joints basally white. Wings not broad, hyaline and iridescent ; stigma and radius infusate, radix and often tegulae white ; areolet pentagonal, with the outer nervure entirely wanting ; radial cell short, twice longer than broad, subtrapeziform and not externally arcuate ; nervellus distinct, postfurcal, intercepting a little above the centre. Length, 4—7 mm.

This species, whose areolet is said by Thomson to resemble that of *Hemiteles*, may be recognised by the interception by the nervellus above

the centre of the first recurrent nervure, the basally trituberculate petiolar area and the remarkable conformation of the ♂ flagellum. Gravenhorst remarks that the ♂ in conformation and abdominal sculpture is very like *Schizopyga podagrica*, but with the legs a little more slender and the thorax more convex; his female, with canaliculate basal segment, cannot, I think, be co-specific, though admitted as such by modern authors. The long terebra and abdominal conformation render this species closely allied to *Pimpla*.

There appear to be no records of the economy of this species, which occurs in Belgium in July and August, though it is probably not uncommon with us, since Bridgman found it at Brundall, near Norwich, in May and Bignell has taken it at both Bickleigh and Exeter, in the middle of September. There are examples of both sexes in Marshall's collection in the British Museum from Botusfleming, in Cornwall. It is probably not uncommon in the New Forest; Adams has taken it at Lyndhurst and I found both sexes in Matley Bog, in damp situations in August, 1901; the male was flying to a thistle head.\* Tomlin has sent me a ♂ from Carlisle in September and both sexes are singly represented from Shere in Surrey in Capron's collection.

## 2. *subrufa*, Bridg.

*Polysphincta subrufa*, Bridg. Trans. Ent. Soc. 1887, p. 377; Schm. Opusc. Ichn. xv. 1166, ♀.

Shining and black, with the thorax broadly red beneath. Head moderately constricted behind the eyes; clypeus and mandibles dull white, with the apices of the latter piceous. Antennae simple, rather longer than three-quarters of the body. Thorax black with the meso- and meta-sternum, and lower half of the mesopleurae, red; mesonotum with the notauli subobsolete; metathorax with the three upper areae distinct. Scutellum black. Abdomen immaculate; basal segment as long as its apical breadth, discally bicarinate to beyond its centre and, like the second, obsoletely scabriculous; second and third segments transversely impressed, the remainder smooth and nitidulous; terebra stout, as long as the basal segment or one fifth of the abdomen. Legs red; posterior tarsi, except their basal joints basally, and the apices of their tibiae infusate; base of the hind tibiae stramineous, bounded by an infusate band. Stigma testaceous with its base paler, tegulae stramineous; radial cell lanceolate and one-third longer than the basal abscissa of the radius; nervellus not very distinct and intercepting a little below the centre. Length, 6 mm.

Bridgman thought this species most closely allied to *P. percontatoria*. But, if his description be sufficiently exact, the unimpressed third to fifth abdominal segments will at once distinguish it from all our other species.

It was described from two females; one taken by Champion at Aviemore in Scotland, and the other by Atmore at Kings Lynn in Norfolk during June, 1887. I have heard of no additional records.

\* While watching this male, I saw an inexplicable occurrence: A wasp (*Vespa*? *vulgaris*) brought a larva in its mouth and carefully placed it at the base of one of the leaves of this thistle (*Cnicus palustris*), against the stem. I took the larva, which might perhaps have burrowed into the stem if left. It was quite healthy, though it had eaten nothing, on the 23rd of the following December; but had died by the beginning of April, 1902, though not before changing sufficiently to show a distinctly dipterous head. Was this the larva of *Acrocera* or *Ogcodes*? If so it was certainly not "stored up" and I do not think it possible I can have mistaken a *Crabro* for a *Vespa* (cf. E. M. M. 1902, p. 205).

3. *tuberosa*, Grav.

*Polysphincta tuberosa*, Gr. I.E. iii. 115; Tasch. Zeits. Ges. Nat. 1863, p. 271; Entom. 1882, p. 169 (fig.), ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 31, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1880, p. 114; et Thoms. O. E. xii. 1252.

An elongate, cylindrical and somewhat shining black species. Head strongly constricted behind the eyes; clypeus piceous and palpi pale stramineous. Antennae simple filiform and a little shorter in ♀ than the body; infusate and darker above. Thorax gibbulous, narrower than the head and longer than high; pronotum, and perhaps a callosity before the radix, sometimes white; mesopleurae smooth and notauli very distinct; metathorax with the areola elongate, parallel-sided and apically incomplete. Scutellum sometimes apically badious, with the postscutellum concolorous. Abdomen cylindrical, double the length of the head and thorax, and as broad as the latter; basal segment nearly smooth with no carinae, a little longer than the hind coxae and transversely impressed before its apex; segments two to five very uneven and each with a shining and determinate tubercle on either side; terebra not quite half the length of the abdomen, with the valvulae parallel-sided and pilose. Legs somewhat slender; the anterior red or fulvous with the coxae and trochanters paler than the hind ones and usually more or less nigrescent; hind legs infusate with the coxae and trochanters at least basally black, femora entirely or above rufescent, tibiae except apically and before the base and often the two or three first tarsal joints basally whitish; apical tarsal joint dilated and double the length of the penultimate, claws of ♀ distinctly lobate basally. Wings normal, slightly clouded; stigma and radius infusate or dull stramineous, radix and apex of the tegulae white; radial cell lanceolate; nervellus distinct and intercepting only slightly below the centre. Length, 5—8 mm.

This species is among the largest of the genus and its legs are considerably variable in colour. It may be known by the head, viewed from in front, being broader than high and, behind the eyes, shining and constricted; the antennae obscurely infusate beneath; the very distinctly tuberculate sides of the abdomen and its short terebra. The central segments are said to be sometimes slightly red-margined. It resembles *Pimpla pictifrons*, Thoms., but is larger with the areolet incomplete and the flagellum more attenuate apically.

Some interesting details of his rearing this species are given by Bignell (Entom. 1882, p. 174): he beat a spider, *Epeira cucurbitina*, Clerck., from an oak at Stonehouse in Devonshire on 22nd of the preceding May and across its back was lying a larva, the whole resembling "a miller's man carrying a sack of flour." The larva was full-fed on the 24th. "It had no legs, but in place of them it had sucking-discs, two on the second segment and four on the third and fourth, six of them occupying the usual place of the legs; the other four were half covered with the skin-fold usually seen on lepidopterous larvae; on its back it had eight tubercles, the first on the fourth, the others on the seven following segments; each tubercle was surmounted by two rings of hooklets, with three or four in the centre. The object of these was to suspend itself by the web while feeding on the last remains of its victim, and holding on after it was consumed; when the whole of the spider's body had been extracted, the legs and empty skin were allowed to fall down. The larva then commenced to make itself a cocoon, which was finished by the third day; it was

during this time that the tubercles had to play such a prominent part, having to perform the work of the claspers of an ordinary caterpillar. When a tubercle attached to the silken cord had to be removed, it was done by withdrawing the hooklets into the tubercle, when it at once became disengaged and ready to make another attachment. From one spiracular line to the other were rows of black dots, two on the second segment and two on each of the remainder; the centre of each was occupied by a short hair. The anal segment often had a very important part to perform, by being brought round to the assistance of the mouth; I first observed this while it was feeding, to disengage some internal portion of the spider from its jaws; afterwards it was frequently used to attach the silk to some part of the cocoon when the blunt round head of the larva appeared not to be able to attach the silk to its satisfaction. When full-fed the larva was about three-eighths of an inch (10 mm.) in length. I have no hesitation in saying that this larva had fourteen segments (counting the head as one). Cocoon shuttle-shaped, whitish and thin; the movements of the larva and pupa were perceptible through the thin cocoon. The perfect insect appeared on the 12th June." Bridgman, referring to this specimen, sent him to name, remarks "I have the same species, given to me by Mr. F. Norgate" who did not take it in Norfolk "with the cocoon and spider-skin exactly like Mr. Bignell's."

The only specimen I have seen of this handsome species is a female, which was swept by Elliott from herbage near the Tay at Birnam in Perth, opposite Dunkeld, on 20th August, 1907.

#### 4. *multicolora*, Grav.

*Polysphincta multicolor*, Gr. I.E. iii. 119; Tasch. Zeits. Ges. Nat. 1863, p. 271, ♂ ♀. *Zaglyptus multicolor*, Schm. Zool. Jahr. 1888, p. 433. *Pimpla Fairmairii*, Lab. Ann. Soc. Fr. 1858, p. 814, ♀; cf. Fitch, Entom. 1882, p. 172.

Head black with the palpi, and generally two facial dots below the antennae, white. Antennae infusate with the basal joints whitish, the intermediate testaceous and the apical infusate, beneath; of ♀ filiform and a little longer than half the body. Thorax gibbulous and black with the meso-pleurae, -sternum and more or less of the -notum, the meta-pleurae or a dot on each, red; a line before the radix stramineous. Scutellum red, with its apex and the postscutellum flavous. Abdomen of ♂ slender and cylindrical, narrow and twice longer than the thorax, of ♀ subconstricted at base and apex, a little longer than the head and thorax, and as broad as the latter; apices of the segments and the lateral tubercles glabrous; terebra about half the length of the abdomen, with the valvulae pilose. Legs normal, pale testaceous or whitish, paler and more translucent in ♂; hind coxae and femora fulvous, apex of their tibiae and of their tarsal joints, as well as a band before the base of the former, nigrescent. Wings hyaline and iridescent; radius and stigma infusate, radix and tegulae white; nervellus distinct and intercepting hardly below the centre. Length, 6—8 mm.

Brischke says the metathorax is sometimes entirely black in the ♀. The ♂ is much more slender than the ♀, whose facies resemble those of *P. carbonata*, though the terebra is decidedly longer.

Dr. Laboulbène's very excellent description of *P. Fairmairii* agrees perfectly with those of Gravenhorst and Taschenberg, and the only wonder is that no one has hitherto synonymised them. The former adds that in his two ♀♀ the apices of the cheeks were clear flavous, the

labrum rufescent, the antennae consisted of about 25 joints, the thorax was very finely punctate with fine pubescence, the apices of some of the intermediate tarsal joints were infusate, the apices of the hind femora nigrescent, the abdomen was punctate and pubescent; and the basal segment of the beautiful figure (pl. xvii, no. 11, fig. 11) is represented as distinctly bicarinate throughout and apically tuberculate in the centre. So minute is the description that the interalar hooks of the hind wings are said to be arcuate, simple and five or six in number, of various sizes (fig. 10).

In June, 1856, Laboulbène found in the Park de Villegenis three satiny grey and slightly shining larvae in a dry and curled leaf on an oak tree. They were slightly moving in the centre of a white bundle of spiders' web, on which was a dead spider, *Clubiona holosericea*, DeG., which is common in Britain. The larvae moved their heads horizontally and seemed affixed by their legs, which are on the dorsal and not the ventral surface; with these they walked slowly, holding their heads erect. One specimen was killed for examination and the other two bottled for observation. A fortnight later two females of *Polysphincta multicolora* had emerged and were already dead when discovered. They had emerged from a silken, oblong, fine, whitish cocoon, spun by the larvae.

The larva is elongate, a little curved and consists of fourteen segments, including the anal tubercle; the colour is whitish-grey, slightly shining and satiny. The alimentary canal appears interiorly brown and, beneath the tegumentary envelope, is a multitude of whitish granules, which are immediately below the skin; these have been very perfectly described by M. Fabre in the larva of *Sphex flavipennis* as a composition of uric salt, serving as organs of excretion (Ann. Sci. nat., Zool. ser. 4, vi, p. 167) and M. Barthélemy has further proved their uric nature in the Tachinid, *Scenometopia atropivora* (lib. cit. vii. p. 115). The head of the larva is small, curvilinear-triangular in shape, brown and furnished with two small and biarticulate antennae; its clypeus is subcircular and ciliated; and there are two mandibles, though the oral organs are very difficult to distinguish. The thoracic segments are the largest and are dorsally and laterally rounded. The abdominal segments are, perhaps, though at most inconspicuously laterally lobed; the first to the seventh bear true retractile pseudofeet, similar to those of Lepidopterous larvae, in the centre of the back, each having, also like them, a circle of hooks which holds firmly in any position. The eighth and ninth segments are trapezoidal and form, with the anal appendage, an inverted cone. There are nine pairs of spiracles, the first being on the anterior margin of the metathorax; the second on the basal abdominal segment, *i.e.* the fourth of the larva; the third to ninth pairs are on the second to eighth abdominal segments. A long tracheal tube traverses the length of the body and branches laterally to each spiracle. These tracheae are white, silvery in the intestinal tube, and the apical as well as those to its corresponding spiracles appears black through the transparency of the larva's body under a microscope. The ventral region in general is concave, smooth and apodous; the sides of the body are strongly rounded; but the most important point of the whole larva is the dorsal pseudofeet in the centre of the dorsal region. Length, 7 mm. Laboulbène, almost certainly erroneously, concluded that these larvae had subsisted upon the material of the spider's web and not upon the spider itself. He gives no description of the pupa; and simply says that their cast skins present no features of interest.

Bignell has also bred this species in south Devonshire on 13th August from a spider *Meta Merianae*, Scop., upon which he says it is ektoparasitic. Beaumont took a ♂ at Oxshott in July, 1893.

In my garden at Monks' Soham I beat a young *Epeira cucurbitina*, Clerck., from an apple tree on June 1st, 1907, with one of these larvae

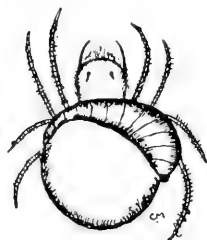


fig. 1.

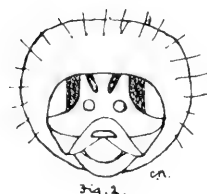


fig. 2.

wrapped like a muffler round its neck (fig. 1). The larva's tail is just above the left hind coxa; its head in the centre of the side of the abdomen; the head (fig. 2) is dark and chitinous, and not at all inserted in the spider's body; the lateral lobes usual in ichneumonidous larvae which Laboulbène failed to notice accurately, are wanting, at all events at this stage of its life; it was then darkish grey with the head brown and I only detected thirteen segments in all. During the 2nd, 3rd, and 4th of June the larva continued to suck the spider without moving, growing very gradually in bulk, to the no apparent inconvenience of its host; but on the morning of the 5th it had evidently shed its skin (though no vestige of it was discoverable) since it now possessed, in place of the ordinary segmentation before shown, eight very distinct dorsal prolegs, a much attenuated cauda and a pale grey head with a central longitudinal line and two oblique ones on either side of it paler. It had, too, moved its head from the lateral position shown in fig. 1, to the very centre of the host's

abdomen, immediately behind the hind coxae. By the evening of the 5th the abdomen was sucked quite dry and the larva had, without relinquishing the position of its tail—which appeared immovable throughout its actively vampire state—taken up a longitudinal position and was sucking each leg individually. By the morning of the sixth, the spider, excepting a leg or two which still afforded nutriment, was quite consumed, and the larva was attached entirely to the web by its dorsal prolegs, each of which terminates in about a hundred (I counted them) black hooks, arranged in three subirregular concentric circles. It is now olive-green, with two dark streaks on the frons and the inner side of the eyes blackish; there is I think no doubt that these are true eyes, except for which the capital markings are sufficiently similar to those of entomophagous ichneumonidous larvae (cf. *Mesostenus obnoxius*, I.B. ii. 261, &c); the head is as shown in fig. 2, with the body throughout setiferous as shown in the second segment behind the small head. When annoyed, the larva moves vertically—not horizontally, cf. *supra*—with strong jerks, but does not move its tail. It is still curled longitudinally round the empty spider's skin, and is much attenuated anally. At 5 p.m. on the 6th, the parasite had discarded its host and begun to spin a web. At 10 p.m. on the 8th, the cocoon was shaped and at 10 p.m. on the 9th, it had become notably thicker and was pure white. On the 10th the cocoon was completed and at 10 a.m. on the 11th black exuviae had been ejected through the anal end of the cocoon. A female *P. multicolora* had just emerged on the 3rd July and was dead, though still quite soft. On the 5th of August, 1905, I took a male of the same species on the window of my house here.



5. *carbonata*, Grav.

*Cryptus carbonator*, Gr. Vergl. Uebers. z. Syst. 1807, p. 264. *Pimpla carbonator*, Gr. Nova Acta Acad. 1818, p. 290. *Polysphincta carbonator*, Gr. I.E. iii. 123; Holmgr. Sv. Ak. Handl. 1854, p. 90; *lib. cit.* 1860, n. 10, p. 31; Tasch. Zeits. Ges. Nat. 1863, p. 272; Thoms. O.E. xii. 1251, ♂ ♀; cf. Ratz. Ichn. d. Forst. iii. 110 et Brisch. Schr. Nat. Ges. Danz. 1880, p. 114.

A shining and entirely black species, with the abdomen somewhat dull. Head distinctly constricted behind the eyes; palpi pale stramineous and clypeus rufescent. Antennae simple, filiform, longer than half the body and nigrescent. Thorax gibbulous, immaculate or with a stramineous radical callosity; mesonotum nitidulous and not pubescent nor densely punctate; metathoracic areola not very distinct. Scutellum entirely black. Abdomen somewhat convex, as long as the head and thorax and as broad as or a little broader than the latter, of ♀ gradually constricted basally from the fourth segment, of ♂ with the second to the fifth parallel-sided; basal segment smooth and hardly subcanaliculate centrally; segments two to five transverse, very closely punctate and densely pubescent, with obsolete tubercles and impressions; terebra one-sixth or one-eighth of the abdomen with the valvulae black, stout and pilose; spicula castaneous. Legs somewhat stout and fulvous, with the apices of the femora and often the ♂ coxae infusate; anterior trochanters white, their coxae basally black in ♀ and internally white in ♂; hind legs with apices of the tarsi and of the tibiae, as well as a band before the white base of the latter, infusate and the ♂ trochanters white; apical hind tarsal joint as long as the third. Wings normal, slightly clouded; stigma and radius piceo-stramineous, tegulae and radix either concolorous or whitish; radial cell lanceolate; nervellus distinct, antefurcal and intercepting a little below the centre; cubital nervure of the lower wing not basally wanting. Length, 4—6 mm.

The ♂ is a much more slender insect than the ♀; both sexes vary in the extent of infuscence of the coxae, of which (unlike *P. tuberosa*) the hind ones are not darker than the anterior, and of the ♀ hind tibiae. It is very like *P. tuberosa* but the head is less narrowed posteriorly, the areola subobsolete, the abdomen distinctly explanate centrally and fully four times as long as the terebra, which has more incrassate valvulae; the legs, though somewhat variably, are differently coloured and their femora are stouter. From *P. rufipes*, Grav., it may be known by the distinctly nigrescent apices of the hind femora, shorter terebra and much less determinately bicarinate basal segment.

Blackwall tells us something of the economy of this species (Brit. Assoc. Report, 1842, p. 68); he says that immature spiders of the species *Lyiphia pusilla*, Sund. and *Leptiphantes minutus*, Bl., "are frequently infested by the larva of a small ichneumon, which feeds upon their juices and ultimately occasions their death. This parasite is always attached to the upper part of the abdomen, near its union with the cephalothorax, generally in a transverse but occasionally in a longitudinal position, and, though it proves a source of constant irritation, is secured by its position from every attempt of the spider to displace it. Being apodous, it appears to retain its hold upon its victim solely by the instrumentality of the mouth and of a viscid secretion emitted from its caudal extremity. More than one larva is never seen on the same spider, which, indeed, could not supply sufficient nourishment for two." Then follows a rough description of a

larva with a "smooth uniform surface," which later spins a silken cocoon after having quitted the body of the host. From this cocoon the ichneumon emerged at the end of a month and the female laid her eggs—a very rare observation—on a new victim's body. Subsequently Blackwall published the same history, though in fuller detail, in *Ann. Nat. Hist.* 1842, p. 1 *et seqq.*:—A young female of *Epeira antriada* (*Meta Merianae*, Scop.) was captured in April, 1838, bearing one of these ichneumon larvae; the latter was fully developed on 27th June following and proved to be a female of *P. carbonata*, Grav. Blackwall also bred on 16th August, the male of the same parasite from another *Meta Merianae*, taken on 20th July, 1838.

Boie further describes the habits of this species, the larva of which he found on two young individuals of *Epeira diademata*, Clerck, (*Stett. Ent. Zeit.* 1846, p. 292). He says that upon one of these there were three larvae, which were arranged at such regular intervals that one might suppose them to be whitish epidermal marks; on the other spider there were two larvae. These larvae, like true vampires, grew in size at the expense of the spiders, which spun an incomplete bundle of web and died. Two larvae only, one on each spider (proving Blackwall's assertion to be at least partly true) were fully grown. These constructed a greenish-grey cocoon and became imagines on July 1st. They had been found on the spiders on 14th June and spun their cocoons on 21st of the same month, immediately their victims had died.

Ratzburg's record respecting this species (*Ichn. d. Forst.* iii, p. 111) "Hr. Drowsen hat diese Species aus Spinnneneiern erzogen," and Brischke's breeding of it from a sawfly, *Nematus ventricosus*, are probably a little lax.

In the spring of 1869, van Vollenhoven received an immature specimen of *Epeira cucurbitina*, Clerck., on which a parasitic larva was feeding. The spider spun a web on the following day and the ichneumonid larva continued to grow rapidly during the next three or four days; it then spun a cocoon of its own and allowed the empty spider's skin to fall. Twelve days after the completion of the cocoon a male *P. carbonata* emerged from it (*Tijds. v. Ent.* 1870, pp. 17—19).

## 6. *Bohemani*, Holmgr.

*Polysphincta Bohemani*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 30; Thoms. O. E. xii. 1253, ♀; cf. *lib. cit.* xix. 2128.

A dull black and red species. Head distinctly constricted behind the eyes, from in front transverse and subcoarctate below the prominent eyes; frons impressed on either side above the antennae; mandibles, palpi and apex of the clypeus white. Antennae infuscate, basally testaceous with the scape white beneath. Thorax red with the pro- and meta-thoraces mainly black; mesonotum dull, densely and finely punctate and pubescent with elongate notauli; metathorax dull and very finely scabrous with the sulcus obsolete and a supracoxal red dot; petiolar area nitidulous and basally incomplete. Scutellum and postscutellum red. Abdomen of ♀ nigrescent, of ♂ badious, and distinctly dull; basal segment not shorter than the somewhat elongate hind coxae, deplanate laterally at the apex, with the carinae not conspicuous; second to fourth segments transversely impressed before the apex but not laterally tuberculate; terebra shorter than the basal segment with the valvulae pilose. Legs normal with the

femora stout; the anterior stramineous, and the hind ones dull fulvescent with the trochanters stramineous, tibiae apically and internally and before the base infusate, their tarsi ferrugineous with the first joint basally pale and the apical explanate. Wings slightly clouded; stigma nigrescent or fulvescent, radix and tegulae white; nervellus antefurcal and intercepting below the centre. Length,  $3\frac{1}{2}$ —5mm.

This species is at once known from all other indigenous kinds by the very dull and thickly pubescent thorax, the colour of which is similar to the strongly nitidulous one of *P. multicolora*, though the terebra is very much shorter in the present. The male has not before been described; it differs very slightly from the ♀ in its paler abdomen and smaller size.

I found one male and three females of this very distinct species in Dr. Capron's collection, mixed with *P. percontatoria*; they were in all probability taken about Shere in Surrey. It has not before been recorded from Britain and, although it occurs sparingly throughout northern and central Europe, there are no notes of its yet having been bred.

### 7. *percontatoria*, Müll.

*Ichneumon percontatorius*, Müll. Prodr. 154, ♀. *Polysphincta percontatoria*, Gr. I. E. iii. 120, excl. var. 2; Tasch. Zeits. Ges. Nat. 1863, p. 270, ♀. *P. phoenicea*, Hal. Ann. Nat. Hist. 1839, p. 116, ♂ ♀. *P. scutellaris*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 33, ♂. *P. pulchrator*, Thoms. O. E. viii. 757, ♂ ♀; cf. lib. cit. xii. 1253.

Black and somewhat shining, with the thorax more or less red. Head hardly narrowed behind the eyes, mouth white; ♂ with the clypeus apically fulvescent and centre of the mandibles also white. Antennae with the scape basally white beneath. Thorax gibbous; a line beneath and a callosity before the radix, usually also the base of the mesopleurae, white; mesonotum not dull, discally or two marks castaneous, and sometimes the sternum also rufescent; metanotum with the areola narrow, parallel-sided and apically entire; petiolar area small and entire. Scutellum and post-scutellum entirely or only apically castaneous. Abdomen sessile and subcylindrical, very slightly longer than the head and thorax and as broad as the latter, of ♂ sometimes dorsally ferrugineous; basal segment hardly longer than the hind coxae, distinctly bicarinate and on either side depressed before the apex; second to fourth segments subbadioid, alutaceous and shining, with an impressed subarcuate line before the apex and another on either side at the base, centrally a little pointed and raised, but not circularly tuberculate; terebra one sixth of the abdomen. Legs not very slender, fulvous and darker in ♂; anterior coxae and trochanters white; hind coxae basally black, their trochanters and tibiae whitish, the latter with the apices and sometimes a subobsolete band before the base nigrescent; their tarsi concolorous with the third and fifth joints of equal length. Wings hyaline and iridescent with the stigma and radius infusate, radix and tegulae white; hind wing with the cubital nervure not wanting basally; its first recurrent straight, with the nervellus entirely wanting. Length, 4—6 mm.

This may at once be known from all our other indigenous species except the next-described by the unintercepted first recurrent nervure of the lower wing, which has no nervellus at all; its legs and general outline are more slender than those of *P. carbonata*; it is smaller with the femora stouter than *P. pallidipes*, Holmgr., and Gravenhorst says that the submarginal nervure is shorter than in any of the other species of this genus known to him.

Haliday indicates no locality for this species, which he probably found in Ireland; it is said to occur on the Continent from July to September and there are British specimens in Desvignes' collection, though I can discover no more recent records. I possess, however, several males taken at Reigate in July and August, 1872, by Wilson Saunders; both sexes in Capron's collection from Shere and Piffard's from Felden in Herts.; and a male bred on 18th August, 1900, from the larval case of *Fumea casta* from Epping, which more probably had been tenanted by a spider.

### 8. *gracilis*, Holmgr.

*Polysphincta gracilis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 32, ♂ ♀. Var. *P. pallipes*, Holmgr. lib. cit. p. 33; Thoms. O.E. xii. 1252; Schm. Opusc. Ichn. xv. 1171, ♂ ♀. Var. *P. nigricornis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 33, ♀; Brisch. Schr. Nat. Ges. Danz. 1880, p. 114, ♂.

A slender and elongate species, black or badius and somewhat shining. Head not strongly constricted behind the eyes; mouth testaceous and palpi white. Antennae simple and nigrescent, with the base pale beneath. Thorax (in type form) immaculate; mesonotum nitidulous and nearly glabrous; metathorax smooth with the areola complete, dull, narrow and irregular. Scutellum black. Abdomen subparallel-sided and nitidulous: the four basal segments transversely impressed before the apex and the second to fourth also obliquely at the base, enclosing a very determinate and subrhomboidal space, but (in type form) with no tubercles; terebra (in type form) very short, with the valvulae awl-shaped. Legs somewhat elongate and slender, red with the trochanters, (in type form) apices of the femora and the anterior coxae pale stramineous; hind coxae piceous, their tarsi and apices, as well as (in type form) an external mark before the base, of their whitish tibiae infusate; apical hind tarsal joint as long as the third. Wings hyaline, with the tegulae white and stigma pale fuscous or fulvescent; radial cell lanceolate, apically straight and somewhat elongate; first recurrent of the hind wings entire, nervellus wanting; its cubitus not wanting basally. Length (in type form) 5—6 mm.

The variety *pallidipes*, Holmgr., differs materially in having the second to fourth abdominal segments with a tubercle on either side, the terebra as long as one-third of the abdomen and is of smaller size; its author admits it to be very similar to his *P. gracilis*, but points out, in addition to the above structural features, that the legs are differently coloured. The variety *nigricornis* agrees with *pallidipes* in the tubercular central segments, in the length of the terebra and in point of size; but differs from it in having the legs more slender and the metathoracic areola incomplete; and from both it and the typical form in the hardly posteriorly narrowed head and the antennae entirely nigrescent below.

Thomson simply thought it "not impossible" that *P. nigricornis* and *P. gracilis* might be varieties of *P. pallidipes*; but Schmiedeknecht has unreservedly treated them as such, which the abdominal conformation renders improbable. If, however, they be referable to a single species, *P. gracilis* certainly takes priority.

With respect to the economy of this species, the Rev. A. Matthews, of Gumley, wrote to Fitch (Entom. 1882, p. 173):—"On July 4th, 1874, my brother, the Rev. H. Matthews, found a spider with a white maggot-shaped larva lying across its back, between the thorax and abdomen,

firmly attached by each extremity of its body to the under side of the spider's thorax, between the articulations of the legs. He brought them immediately to me, and we placed them in a dry phial-bottle, with a few Aphides for food, and tied a piece of muslin over its mouth. The spider soon made a web in which the Aphides became entangled, and thus they remained for the rest of the day without any material change, except that at one time the larva had nearly emptied the body of the spider, and had himself become green; but this was only a temporary change, for shortly after he resumed his original opaque-white hue. On the following morning he had spun himself up in a long narrow orange cocoon, attached to the web of the spider, and had changed into a pupa; while all that remained of his unfortunate companion was a shrivelled skin lying at the bottom of the bottle. On July 14th the imago emerged from the cocoon in the shape of the ichneumon which I now send, together with the aforesaid cocoon and the mortal remains of the spider." To this Fitch adds that the ichneumon is most closely related to *Polysphincta pallidipes*, Holmgr., but does not exactly agree with the description of that species: "whether it is a variety of this or a new species must be left for further consideration," which it never received. He adds that the cocoon is oat-shaped, ochreous and quite opaque; and that the spider was probably *Epeira cucurbitina*, Clerck.

The typical *P. gracilis* was not, however, introduced as British till 1887, when Bridgman brought it forward (Trans. Ent. Soc. p. 377) on the strength of a female of "this very distinct species" taken by Champion at Aviemore in Scotland. Bignell has bred it in south Devon on 18th June from the common spider, *Meta segmentata*, Clerck., upon which he says it is ectoparasitic. I have a full series of both sexes in Capron's collection, probably taken at Shere in Surrey.

### ACRODACTYLA, Haliday.

Hal. Ann. Nat. Hist. 1839, p. 117; *Symphylus*, Först. Verh. pr. Rheinl. 1868, p. 171.

Face parallel-sided, strongly nitidulous and obsoletely punctulate; clypeus strongly transverse, basally elevated, apically deplanate and glabrous; cheeks very narrow and not short; frons centrally impressed, glabrous and nitidulous; occiput finely bordered basally; eyes very prominent. Scape not deeply excised; flagellar joints pilose and simple. Mesonotum transversely cristulate on either side before the notauli, which are deeply impressed, elongate and discally coalesced. Scutellum glabrous, nitidulous, hardly convex and apically rounded. Abdomen basally attenuate with the central segments very obsoletely impressed and subparallel-sided; basal segment discally canaliculate throughout, with spiracles before its centre; anus of ♀ apically cleft beneath; terebra shortly exerted. Legs slender with the femora simple; tarsi apically incrassate, the claws beneath with a dilated obtuse lobe. Wings normal with stigma somewhat narrow and areolet entirely wanting; apical abscissa of the radius straight and twice longer than the basal; nervellus wanting, its median nervure strongly curved, obsolete basally and wanting apically beyond the oblique second recurrent.

"The species of this little group are closely allied to *Polysphincta* (and to *P. percontatoria* in particular), but may be distinguished by the smoother abdomen attenuate at the base, the narrower stigma, and the structure of the

claws. From certain *Pimplae*, which agree in this last respect, they may be known by the want of the areolet, in addition to the former characters," says Haliday in erecting it. This genus, which was never described as *Barypus* (*nec Baripus*, Dejean 1828, a genus of geodephagous beetles), though so designated in Curtis' "Guide," has the central segments impressed and not compressed as stated by Westwood (Introd. ii, Synops. 57). It is said by Ashmead to differ from *Polysphincta* in having the "transverse cubital nervure wanting, the first branch of the cubitus being interstitial with the first abscissa of the radius" and not forming a distinct angle with it; he, however, synonymised it with *Oxyrrhexis*, Förster. Its relation to *Polysphincta* is, in fact, very similar to that of *Hemiteles* to *Phygadeuon*—a smaller and degenerate form, best distinguished by its weaker conformation and sculpture, the subobsolete abdominal impressions and puncturation, but especially by the mesonotal cristulae.

### Table of Species.

- |      |   |                  |
|------|---|------------------|
| (2). | 1. Metanotum centrally smooth; mandibles stramineous . . . . .      | 1. MADIDA, Hal.  |
| (1). | 2. Metanotum centrally canaliculate; mandibles testaceous . . . . . | 2. DEGENER, Hal. |

### 1. madida, Hal.

*Acrodactyla madida*, Hal. Ann. Nat. Hist. 1839, p. 117, ♂ ?

Head transverse and rounded behind the prominent eyes; palpi and mandibles pale stramineous; face longitudinally convex centrally. Antennae a little shorter than the body, filiform, piceous and pilose throughout; basal flagellar joint half as long again as the second. Thorax not broader than the head, immaculate; mesothorax strongly nitidulous with a few short grey hairs; metathorax dull, deplanate and apically attenuate with long and grey pilosity obscuring the spiracles, its apex reflexed and all costae wanting. Scutellum often badius. Abdomen infusate-piceous with the incisures more or less black; basal segment shining, nearly twice longer than broad and nearly parallel-sided; central segments nitidulous with sparse grey pilosity; venter pale with the four basal segments plicate; terebra not longer than the basal segment. Legs stramineous throughout; the hind ones with their tarsi and apices of their tibiae infusate; all the claws black; apical joint of the hind tarsi thrice longer than the penultimate and twice than third, its claws small, curved and neither pectinate nor extending beyond the elongate pulvilli; calcaria very small and subequally long; coxae subcylindrical. Wings hyaline and not narrow; stigma infusate, radix and tegulae white; discoidal cell apically rectangular; lower wing with the first recurrent curved and entire. Length, 4—6½ mm.

"England, F. Walker.—Ireland, in shady groves" (Haliday). "Captured at Walkham Valley, 28th July, Bickleigh, 5th August," both in Devonshire (Bignell). I have a full series of both sexes taken about Shere in Surrey by Dr. Capron, from which I have been enabled to sufficiently amplify Haliday's pertinent but brief description. Mr. Stanley Edwards has given me a female from Lynton in Devon, captured in 1890.

2. *degener*, Hal.

*Acrodactyla degener*, Hal. Ann. Nat. Hist. 1839, p. 117, ♂ ♀.

Palpi stramineous; antennae basally stramineous; metathorax canaliculate; abdomen infusate-piceous with the incisures more or less black; legs stramineous, the hind ones with their tarsi and apices of their tibiae infusate; stigma piceo-stramineous. Length,  $3\frac{1}{2}$ — $4\frac{1}{2}$  mm.

The above description of Haliday is sufficient to distinguish this species from the last, though it is well to further note that the mandibles are testaceous, not stramineous; the face is centrally less prominent; the two basal flagellar joints are of subequal length; the basal segment is longer with the spiracles inconspicuous; the nervures of the hind wing are all pellucid, its first recurrent straight and nervellus wanting. It was sufficiently distinguished originally, however, by the basally paler antennae, canaliculate metanotum, constantly paler stigma and smaller size.

"In the same situations with the last" (Haliday). Parfitt tells us he once found the reddish larva of this species feeding on a small spider in Devonshire (Trans. Devon. Assoc. 1881, pp. 41—2): "The body of the spider was not large enough to contain the larva, so that part of it was exposed. The spider lived until the larva was ready to undergo its change into pupa. It then spun a cocoon, fusiform and angular, attached at both ends to the glass cover of the box after the manner of a hammock. It remained in pupa about a fortnight, and came out September 19th, 1874." Pickard-Cambridge refers to the exhibition at a meeting of the Zoo. Soc., 15th February, 1881, of examples of this parasite, bred by him the preceding year in Dorsetshire from larvae adhering to the outer surface of the abdomen of two spiders, *Linyphia obscura*, Bl. and *L. zebrina*, Menge., together with their victims and empty cocoons (*cf.* Spiders of Dorset, ii. 579). He states that "these larvae are in some seasons very abundant: I have found them not only on the above-named spiders, but on several species of *Theridion*, as well as on other species of *Linyphia*, and on some *Epeirae*. It is possible that more than one species of parasite has been concerned, though all the larvae which have come under my own notice appeared to be identical. Mr. Parfitt seems to have been under the impression that the larva from which he bred *A. degener* was an internal parasite, obliged to come outside owing to the body of the spider being insufficient to contain it. This is, I think, a mistake. These external parasites are probably hatched from eggs affixed to the outer surface of the spider's abdomen, or at any rate very slightly inserted" (Entom. 1882, p. 216).

Bridgman records this species from Norwich and Brundall in Norfolk; and Bignell from Dousland in Devon, towards the end of August. The latter gives (Trans. Devon. Assoc. 1898, pp. 471-2) a very full account of its economy upon *Linyphia obscura*. He says that he believes he is the only person who has ever witnessed the ichneumon's attack on a spider in its native haunts. Having selected her victim, she approaches it with care, but it drops from its bough by its silken thread. The ichneumon does not appear perturbed at this manoeuvre, but walks very leisurely down the thread itself to the spider, whom she coaxingly touches with her antennae. The spider then drops further and, in a few seconds, the fly follows and again touches the spider, who, "knowing her foe, resigns herself to her fate and does not move. The fly turns round, walks back-

ward till within striking distance, and then thrusts her ovipositor into the thorax and deposits her egg. The ichneumon egg is hatched in about forty-six hours, the larva taking about ten days in consuming by suction the unfortunate spider. When feeding it lies sack-like across the spider's back until the latter is almost consumed; when the larva finds the foundation upon which it has been resting getting inconveniently small, it attaches itself to the web the spider made, by the tubercles with which it is provided on the back, for the purpose of feeding on the last remains of its victim and making its own cocoon. When this attachment is accomplished the legs and empty skin drop to the ground. The larva, suspended by its back, has now to make itself a cocoon in which to pass the pupa stage; it takes about three days to do this work, and it is during this time that the eight tubercles on the back have to play such important parts." Then follows an account of its spinning, almost verbatim with that given by the same author respecting *Polysphincta tuberosa*. "When full fed, the larva is about three-eighths of an inch in length. The fly is mature and escapes from the cocoon in about twenty days."

I possess several females of this species, taken some years ago, in the neighbourhood of Shere in Surrey by Dr. Capron.

### SCHIZOPYGA, *Gravenhorst*.

Gr. I.E. iii (1829). 125.

Head a little wider than long with vertex very broad; eyes prominent, oblong-ovate, slightly pubescent and hardly emarginate next the scrobes; mandibles very broad, apically acuminate and concealed beneath the apex of the not basally discreted clypeus. Antennae slender, filiform and somewhat longer than half the body. Thorax subcylindrical, longer than high; prothorax elongate, notauli deeply impressed; metathoracic spiracles circular, areola elongate, and usually entire. Scutellum subtriangular and somewhat convex. Abdomen subsessile, strongly convex, nitidulous, elongate and oblong-cylindrical, as broad as and nearly twice longer than the thorax, gradually narrowed apically; the segments transversely impressed, with lateral tubercles before the base; first segment margined and bicarinate, second distinctly impressed obliquely in its basal angles; the two apical of ♀ longitudinally cleft ventrally and the ultimate strongly retracted; terebra reflexed and hardly longer than the apical dorsal segment. Legs somewhat short with the femora incrassate; hind femora stout, though hardly broader than their tibiae; tarsal claws curved, acute and nude. Wings somewhat narrow, with no areolet.

Thomson remarks (O.E. 758) on the superficial similarity between *Exochus* and the present genus.

#### *Table of Species.*

- |      |  |                             |
|------|--|-----------------------------|
| (4). | 1. Abdomen not badius; length six millimetres or more. |                             |
| (3). | 2. Areola complete; abdomen entirely black             | 1. PODAGRICA, <i>Grav.</i>  |
| (2). | 3. Areola incomplete; abdomen mainly bright red        | 2. CIRCULATOR, <i>Panz.</i> |
| (1). | 4. Abdomen badius; legs more slender; length 5 mm.     | 3. MINUTA, <i>Grav.</i>     |



1. *podagrica*, Grav.

*Schizopyga podagrica*, Gr. I. E. iii. 127; Holmgr. Ofv. 1856, p. 70; Sv. Ak. Handl. 1860, n. 10, p. 45, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1880, p. 118.

A black and shining species, with variegated legs. Head hardly contracted posteriorly; frons very smooth and slightly impressed on either side above the scrobes; face punctulate and pubescent, somewhat narrower than the frons; palpi piceous or dull stramineous; ♂ with the mouth and face flavous. Antennae filiform; of ♂ half length of the body with the flagellum fulvous, and scape flavous, beneath; of ♀ rather shorter, sometimes infusate throughout but generally with the flagellum ochraceous, and scape flavescens, beneath. Thorax somewhat smooth; pleurae impunctate and strongly nitidulous; areola rectangular and complete. Abdomen of ♂ a little longer than the head and thorax, of ♀ twice longer than the latter; cylindrical and as broad as the thorax, with segments two to four transversely impressed in the centre, and the apical margin subelevated and nitidulous; basal segment distinctly bicarinate longitudinally, but little longer than the hind coxae, margined and gradually a little dilated towards the apex, before which are lateral impressions; second obliquely impressed basally on either side; terebra hardly exerted, black with the spicula red. Legs very stout, with the coxae, except anterior in ♂, black; anterior legs fulvous and paler beneath; hind femora also fulvous with their apices, and sometimes in the ♂ a longitudinal line, black; posterior tibiae whitish with the apices and a mark before the base nigrescent; tarsi fulvous or white, with the apices of the intermediate, and joints of the hind ones apically, black. Wings normal, a little darker in ♀, stigma infusate, radix and tegulae stramineous; first recurrent strong, distinctly postfurcal and intercepted in the centre. Length,  $6\frac{1}{2}$ —8 mm.

None of the British ♂♂ I have examined have the face or mouth pale, nor did Holmgren meet with such a one in Sweden. Hope sent Gravenhorst a female from Netley, in Shropshire, which differed slightly in having the femora almost entirely red, the central hind tibial mark extending to the base and the tarsi nigrescent throughout. I possess a ♂ with the hind tibiae red with only the apex infusate.

This is an uncommon species on the Continent and it appears to be local in Britain. There is a long series in Capron's collection from Shere in Surrey; Donisthorpe took it somewhat commonly at Rossbeigh, in Co. Kerry (Irish Naturalist, 1903, p. 68); and Bignell records it from Vinstone and Exeter, in August and September. Its economy appears still unknown. I took a male in my garden at Monks' Soham on 31st May, 1908.

2. *circulator*, Panz.

*Ichneumon circulator*, Panz. F.G. lxxix. 12; Gr. I.E. iii. Suppl. 1059, ♀. *Schizopyga tricingulator*, Gr. lib. cit. 129 ♂. *S. analis*, Gr. lib. cit. 130; Ste. Ill. M. vii. Suppl. p. 1, pl. xxxix, f. 2; Holmgr. Ofv. 1856, p. 70; Sv. Ak. Handl. 1860, n. 10, p. 46, ♀.

Somewhat shining and black with the abdomen mainly red. Head hardly contracted posteriorly, black with the mouth pale testaceous. Antennae rather longer than half the body, black and basally flavidous beneath. Thorax immaculate, black; areola incomplete apically and

only very slightly narrowed towards the base. Abdomen subcylindrical, as broad as and a little longer than head and thorax; first segment a little contracted basally, longer than broad, with obsolete carinae, black but in ♀ with more or less of the sides and disc rufescent; second segment impressed; second to fifth segments subparallel-sided, quadrate and red with the apical margins of the second and usually third, together with the anus, black; terebra subexserted and reflexed. Legs stout and red; posterior femora of ♀ and often ♂ apically, the dull white hind tibiae at apex and before the base, black; posterior coxae basally or nearly entirely and, excepting the base of their joints, tarsi black; ♂ with the trochanters entirely, and the anterior coxae apically, flavous. Wings a little clouded; stigma and ♀ tegulae black; radix and ♂ tegulae white; first recurrent strong and intercepted a little above the centre. Length, 6 mm.

The abdomen of the ♂ varies considerably in colour: the type form has the third to fifth segments with the apical margin black; Gravenhorst's var. 1 has the fifth entirely black, and in his varr. 2 and 3 the whole abdomen is black.

The ♀ is said to be similar in size and outline to *S. podagrica*, the ♂ to *Polysphincta varipes*, but it is rather more slender than either of these species.

The above synonymy is entered by the Rev. T. A. Marshall in his copy of the "Ichn. Europ." and is certainly correct; it is partly referred to (in Trans. Ent. Soc. 1886, p. 373) by Bridgman.

Panzer took this species uncommonly among *Aphides*; Hope sent a black-bodied male (still in his collection) to Grav. from Netley; Stephens records it from Darenth, in June. On the Continent it is said to occur on oaks, in August and September. Bridgman says it is not uncommon in Norfolk and I possess a female taken there at Horning Ferry, in the middle of September, by Bedwell; Bignell records it from Bickleigh at the end of July, and Capron took one female at Shere. It has once or twice occurred to me by sweeping willows and reeds by the Lark River at Barton Mills, Suffolk, in the middle of June and in late September. The only record of its parasitism is given by Bignell in Buckler's "Larvae," but I must own myself sceptical of its accuracy; he says Adkin raised it from *Heliothis dipsacea*. There is a specimen, taken at Plumstead in the middle of September, in Marshall's collection, in the British Museum.

### 3. *minuta*, Grav.

*Schizopyga minuta*, Gr. I.E. iii. 131, ♀.

Head with the palpi pale stramineous. Abdomen linear-cylindrical, narrower and twice longer than the head and thorax, with the apical margins of the segments subelevated and the second to fifth obscurely infusate at the base; terebra as long as the apical dorsal segment, with the valvulae compressed. Legs fulvous with all the coxae and the posterior trochanters black; posterior tarsi, with the apices of their tibiae and of their femora, nigrescent; hind tibiae and base of their first tarsal joint stramineous, with a mark before the base of the former nigrescent. Wings clouded; tegulae black, stigma piceous and radix stramineous. Length slightly over 2 lines (5 mm.).

This female appears to differ very little from *S. podagrica*, excepting in its dark posterior trochanters, badious abdomen and somewhat smaller

size; no one appears to have mentioned it since 1829, and Taschenberg makes no reference to the type, when looking through Gravenhorst's collection in 1863.

This species was originally taken at Breslau, in May, and has not been found on the Continent since 1829; it was introduced as British by Marshall, in his 1870 Catalogus, but I know of no exact records nor does it appear to have been bred. There are, however, two specimens standing under this name in Marshall's collection in the British Museum, both taken at Groveley Wood, near Salisbury, which look like small and immature *S. podagrica*, with the metathorax and abdomen piceous, the legs also somewhat paler and less stout, and a total length of 5 mm.

### COLPOMERIA, Holmgren.

Holmgr. Ofv. 1859, p. 126; Sv. Ak. Handl. 1860, n. 10, p. 44.

Head smooth and transverse; clypeus imperfectly discreted, somewhat convex and apically rounded; mandibles narrow. Antennae slender, short and attenuate. Thorax longer than high; notauli very distinct with a transverse crista on either side in front; metathorax a little higher than long with the areola narrow and no apophyses. Scutellum normal. Abdomen narrow and smooth; basal segment nearly parallel-sided, longer than broad and discally bicarinate; the second and third obliquely impressed anteriorly with a short and distinctly determinate rhomboidal space; terebra short, slender and hardly as long as the basal segment. Legs slender, with the anterior femora subincrassate, subexcised or strongly sinuate from its centre to apex; anterior tibiae basally curved or subarcuate; apical tarsal joint subdilated, its claws large and in ♀ basally lobed. Wings with the submarginal nervure very short and no areolet; nervellus intercepted and antefurcal.

Holmgren points out that the structure of the front femora will distinguish this genus from all other *Pimplinae*; it is not now quite as he left it, however: he based it entirely upon the femoral conformation and included in it Gravenhorst's *Ephialtes inanis*, now considered, on account of its complete areolet to be a true *Pimpla*. Thomson says (O. E. 758) that this genus differs from *Polysphincta* in the femoral modification and in the mesonotal cristae; but later (*lib. cit.* xii. 1251) he includes it in that genus, considering the distinctions insufficient to warrant generic rank. It appears to me extremely probable that the present genus is synonymous with *Scambus*, Htg. (Jahresb. 1838, p. 267), which is not tabulated by Ashmead (Proc. U.S. Mus. 1900, p. 152), or differs from it only in the absence of the areolet.

#### 1. *quadrisculpta*, Grav.

*Ichneumon quadrisculptus*, Gr. Mem. Ac. Sc. Torin. 1820, p. 378, ♂. *Tryphon quadrisculptus*, Gr. I. E. ii. 250; Ste. Ill. M. vii. 252, ♂; ? Holmgr. Sv. Ak. Handl. 1855, p. 191, ♀. *Colpomeria laevigata*, Holmgr. Ofv. 1859, p. 127; Sv. Ak. Handl. 1860, n. 10, p. 44, ♂ ♀. *Polysphincta quadrisculpta*, Brisch. Schr. Nat. Ges. Danz. 1880, p. 115, ♂.

Black or badius, shining and somewhat smooth; slender and narrow. Head small and narrower than the thorax; palpi and mouth pale stramineous. Antennae infuscate-black, a little longer than half the body; pale beneath and basally testaceous or substramineous. Thorax gibbulous,

with an obsolete testaceous line beneath the radix. Abdomen oblong, black, a little longer than the head and thorax and as broad as the latter; basal segment sessile, canaliculate, transversely impressed, with the apex of the ♂ red; second to fourth segments transversely impressed and sometimes centrally rufescent. Legs fulvous or rufescent with the anterior coxae and trochanters flavescent; hind tibiae pale with the apex and a subobsolete mark before the base nigrescent, their tarsi infusate with the joints basally fulvescent; hind or posterior coxae sometimes piceous. Wings hyaline with a slight infusate tinge; stigma pale, radix and tegulae stramineous. Length, 4—5 mm.

Holmgren says the ♀ sometimes has the antennae entirely, and coxae mainly, black; or only the hind coxae black-marked.

It is found somewhat sparingly among undergrowth and in grassy places throughout northern and central Europe; but nothing appears to be known respecting its economy. In Britain, Stephens records *T. quadrisculptus* as "Found, not uncommonly, in the vicinity of London in June." I have a pair of insects, referred to this species by Capron, who took them about Shere in Surrey, but I confess to searching in vain for the generic characters. Neither Bridgman nor Bignell met with this species in their extensive experience and further confirmation of its occurrence is needed with us, though it is recorded under two distinct genera in Marshall's catalogues.

### CLISTOPYGA, *Gravenhorst*.

Gr. I. E. iii (1829). 132.

Head shortly transverse, narrowed behind the eyes and not buccate; frons deplanate and laterally impressed; face transverse, punctate, hardly narrower than the frons and a little elevated longitudinally in the centre; eyes large, prominent, nude, orbiculate-oval and subentire; clypeus distinctly discreted, slightly deflexed and broadly rounded apically; mandibles narrow, with the teeth of subequal length; cheeks of ♂ deeply sinuate; maxillary palpi somewhat elongate and filiform, the labial shorter and stouter. Antennae slender, filiform, not apically attenuate and of normal length; scape externally excised at the apex; flagellar joints not apically nodulose, the basal elongate and cylindrical. Thorax longer than high, laterally glabrous and nitidulous, and narrower than the head; mesonotum ovate, with distinct notauli; metathorax with the upper areae incomplete and usually sulciform, spiracles circular. Scutellum convex and apically rounded. Abdomen convex, sessile, elongate, subcylindrical, shining, as broad as and twice longer than the thorax; basal segment subobsoletely carinate, a little longer than broad, very slightly constricted basally, with lateral spiracles before the centre; central segments quadrate, and the second to fifth transversely impressed and laterally subtuberculate; anus incassate, with the hypopygium entire, extending nearly to the apex of the abdomen and covering the base of the terebra, which is subreflexed and exerted, about as long as or a little shorter than half the abdomen. Legs normal; tarsal claws not pectinate, of ♀ basally lobate; femora stout, the anterior entire; hind femora and tibiae of equal length with the calcaria short. Wings somewhat narrow, with no areolet; radial cell lanceolate, nervellus distinct.

This genus differs from *Rhyssa*, *Ephialtes*, *Pimpla*, etc., in the entire two apical ventral segments, lack of areolet and in the shorter terebra; it is

related to *Glypta* and *Lycorina* in the impressed abdomen, but differs from the latter in its apically rounded scutellum and from the former in the rugose abdomen, simple tarsal claws, narrow mandibles and short terebra.

*Table of Species.*

- |      |    |  |                            |
|------|----|--|----------------------------|
| (2). | 1. | Abdominal tubercles less distinct ;<br>abdomen black .. .. . | 1. INCITATOR, <i>Fab.</i>  |
| (1). | 2. | Abdominal tubercles more distinct ;<br>abdomen red .. .. .   | 2. RUFATOR, <i>Holmgr.</i> |

1. *incitator*, *Fab.*

*Ichneumon incitator*, *Fab.* E.S. ii. 172. *Pimpla incitator*, *Fab.* *Piez.* 117. (?) *P. ovivora*, *Boh. Sv. Ak. Handl.* 1821, p. 335, excl. ♀. *Clistopyga incitator*, *Gr. I.E.* iii. 134, ♀; *Holmgr. Sv. Ak. Handl.* 1860, n. 10, p. 35; *Tasch. Zeits. Ges. Nat.* 1863, p. 273; *Brisch. Schr. Nat. Ges. Danz.* 1880, p. 115, ♂ ♀; *Voll. Pinac.* xiii, fig. 8, ♀. Var. *C. haemorrhoidalis*, *Gr. I.E.* iii. 135, ♀.

Head black with the clypeus and ligula pale; palpi and all the orbits, as well as often, the face white. Antennae slender and filiform, longer than half the body; entirely or beneath ferrugineous. Thorax gibbous and cylindrical; black with a callosity before the radix, generally also the propleurae and a small line below the radix, white; mesonotum black or ferrugineous, with two more or less elongate discal vittae stramineous; mesosternum and pleurae, and sometimes the metapleurae, pale castaneous. Scutellum black or red, usually with its apex and the postscutellum white. Abdomen parallel-sided, as broad as and twice longer than the thorax; black with the incisures, especially towards the anus, ferrugineous; segments two to five transverse-obliquely impressed on either side at base and before the subelevated apex; hypopygium of ♀ rufescent; terebra hardly half as long as the abdomen, with the valvulae pilose. Legs fulvous and stout; the anterior with the coxae and trochanters stramineous, the former generally basally and the latter laterally nigrescent, their femora dull stramineous or often fulvous, their tibiae stramineous with the intermediate apically and basally infusate, and the intermediate tarsi nigrescent; hind legs with coxae and trochanters more or less black and stramineous or entirely either, their tibiae and tarsi infusate, the former at the centre and base and the latter with the base of the joints whitish. Wings normal, hyaline or very slightly clouded; stigma and radius infusate, radix and tegulae white; nervellus intercepted below the centre. Length, 5—8 mm.

The colouration of this species is extremely variable; var. *haemorrhoidalis* has the face entirely flavous, and the scutellum and anus entirely red; *Holmgren's* variety has the face entirely black, the thorax not at all red-marked and the size smaller.

It is synonymised by *Schmiedeknecht* (*Opusc. Ichn.* 1175) with *Polysphincta elegans*, *Ratz.*, which is said (*Ichn. d. Forst.* ii. 101) to have been bred by *Wissmann* from beech, infested with *Anobii* and *Ptilinus pectinicornis* (cf. *Trans. Ent. Soc.* 1907, p. 21). *Brischke*, however, bred it in Prussia from *Retinia resinana*. It is not very common in northern and central Europe, where it sometimes occurs in May on hazel, and *Tosquinet* records it from Belgium in August. It is by no means an uncommon species in Britain, whence *Hope* sent it to *Gravenhorst* from

Netley in Shropshire. Capron records it from Shere, in Surrey, in 1878 (Entom. 1879, p. 15), there are several females in his collection; and Fitch says that six males and one female emerged from galls of *Cynips Kollari* at Maldon in Essex (*l.c.* p. 116 *et* 1880, p. 258). It is recorded from Bickleigh and Maker, in Devon, in August by Bignell; from Norwich by Bridgman; and from the Lands End district by Maquand. I have seen females taken by Evans at Aberdour, near Edinburgh, in early September; at Lincoln by Musham; at Felden in Herts. by Piffard; at St. Issey in Cornwall by Davies; Ripple, near Dover in August by Sladen; and several from carrot flowers at Bury St. Edmunds and Tostock, in Suffolk, by Tuck in September, 1902. I have seen the female sitting on a white-painted post by the road at Lymington, Hampshire, on 15th August, 1901; both sexes were abundant on the flowers of *Angelica sylvestris* in Barnby Broad, Suffolk, in August, 1898; and I have also taken them towards the end of the same month in Tuddenham Fen.

## 2. *rufator*, *Holmgr.*

*Clistopyga rufator*, Holmgr. Sv. Ak. Handl. 1854, p. 95; *lib. cit.* 1860, n. 10, p. 35, ♂ ♀; Brisch. Schr. Nat. Ges. Danz. 1880, p. 115; Voll. Pinac. pl. xiii, fig. 7, ♀.

Black and somewhat shining. Head with the palpi, and often the vertical orbits, white. Antennae dark red beneath. Thorax sometimes partly red. Abdomen red with at most the basal segment basally or nearly entirely black. Legs red with the front coxae and anterior trochanters substramineous; hind tibiae wholly or partly, and the apices of their tarsal joints, infuscate. Wings very distinctly clouded, and the tegulae white and stigma infuscate. Length, 4—6 mm.

This species is too similar to the preceding to need a detailed description, therefore it differs in the colour of the abdomen and legs; the lateral abdominal tubercles are more distinct and the terebra is a little shorter.

Holmgren found this species sparingly in marshy situations in Sweden, during the first half of August. Bridgman took the only known British specimen in the Norfolk Broads: "I took a female of this splendid insect at Brundall, June 3rd, 1881" (Trans. Ent. Soc. 1882, p. 162 *et* Trans. Norf. Soc. 1893, p. 630).

## LYCORINA, *Holmgren.*

Holmgr. Ofv. 1859, p. 120; Sv. Ak. Handl. 1860, n. 10, p. 43.

Body short and stout. Head transverse and somewhat short, with the clypeus smooth and apically truncate, epistoma discreted by two impressed facial lines; frons mutic and carinate between the scrobes. Antennae filiform, stout and not apically attenuate; scape externally excised. Thorax very stout and anteriorly impressed on either side; metathorax short, with the petiolar and upper areae complete; spiracles minute and circular. Scutellum elevated and subquadrate, with the apex truncate. Abdomen oblong-ovate; basal segment not longer than broad; the second to fourth with a transverse line before the apex and two oblique and basally confluent impressions, enclosing a convex triangle; apical ventral segment of ♀ reaching apex of abdomen and covering base of the terebra, which is a little shorter than the abdomen. Legs normal

and not elongate, of ♂ somewhat slender; anterior tibiae of ♀ subincrassate and basally constricted, the front ones as well as their basal tarsal joint slightly arcuate; tarsal claws short and distinctly though sparsely pectinate; femora apically attenuate. Wings with no areolet; the inner submarginal nervure somewhat elongate; nervellus antefurcal and intercepting distinctly below the centre.

This genus resembles in its oblique abdominal impressions none of the other Ichneumonidae but *Glypta*, from which it is easily distinguished by its broader abdomen in proportion to its length, the apically transversely impressed segments and especially by its quadrate scutellum, which bears some resemblance to that of *Metopius*. It possesses the hitherto unnoticed peculiarity of having the basal abscissa of the radial nervure hardly half the length of the second recurrent in the lower wing.

Only one species is known.

### 1. *triangulifera*, Holmgr.

*Glypta teres*, Ratz. Ichn. d. Forst. ii. 102, ♂ ♀ (nec Grav.) *Lycorina triangulifera*, Holmgr. Ofv. 1859, p. 126; Sv. Ak. Handl, 1860, n. 10, p. 43; Voll. Pinac. pl. xxi, ff. 2 et 3, ♂ ♀.

Distinctly punctate, black and a little shining. Head broadly rounded behind the prominent eyes; frons anteriorly excavate; palpi dull stramineous with their base infusate; vertical orbits very narrowly, and the centrally impressed clypeus, flavescent; face laterally parallel, irregularly and somewhat finely punctate, of ♀ immaculate and of ♂ pale flavous. Antennae with the flagellum ferrugineous beneath. Thorax narrower than the head, somewhat longer than high and sparsely punctulate; pleurae and sternum strongly nitidulous with isolated punctures; metathorax with five upper areae, of which the areola is nitidulous, strongly carinate and not longer than broad; basal area wanting, petiolar coriaceous and vertical. Scutellum with an apical mark and the basal carinae flavidous; postscutellum concolourous. Abdomen with the basal segment somewhat short and strongly impressed longitudinally in the centre and transversely before the apex; the second to fifth transverse and coarsely punctate, with the central triangle smoother; three apical segments of ♀ small, nitidulous and retracted; terebra straight and two-thirds the length of the abdomen. Legs red or fulvescent, with the coxae and base of the trochanters black; hind tarsi and the apices of their fulvous tibiae nigrescent, latter basally flavous. Wings somewhat clouded and normally broad; radix and tegulae flavescent, stigma piceous; radial cell lanceolate, first recurrent intercepted a little below the centre. Length, 6—8 mm.

Ratzburg's *G. teres* is indicated as synonymous with this species by Thomson (O.E. xiii. 1340).

This species, which is uncommon throughout northern and central Europe, was introduced as British by Bridgman (Trans. Ent. Soc. 1882, p. 162) on the strength of a specimen taken about Plymouth by Bignell, but not mentioned in the latter's Devon catalogue; later a male was secured by Atmore at King's Lynn, in Norfolk, in May, 1887—bred (Trans. Norf. Soc. v. p. 66), or captured (*l.c.* p. 631); and a third specimen was found by Harwood of Colchester (*l.c.* p. 66). Ratzburg records it as preying upon *Tinca populella*—surely a very small host—in rolled aspen leaves near Neustadt, in July; and says (Ichn. d. Forst. iii. 111)

that Tischbein once saw them swarming round an aspen, and several times bred them from the longicorn beetle, *Saperda populnea* (cf. Trans. Ent. Soc. 1907, p. 31). I have been enabled to somewhat amplify the published description of this species by the examination of a female captured by Bignell at Bickleigh, on 5th August, 1881; he tells me (*in lit.*) that he has bred another of the same sex from *Pædisca profundana*, in Devonshire. I was so fortunate as to sweep a female from young trees in the Belstead woods, near Ipswich, on 16th June, 1902; the above longicorn is not uncommon there.

### GLYPTA, Gravenhorst.

Gr. I.E. iii. (1829), 3.

Head distinctly transverse, more or less strongly contracted behind the oval eyes; frons sometimes with cornigerous excrescences, vertex narrow; clypeus convex, apically rounded or subtruncate, sometimes densely pilose apically, and nearly always indistinctly discreted from the usually prominent epistoma; genal costa continuous. Antennae slender and filiform, about the length of the body. Thorax stout and gibbulous; notauli indistinct; metathoracic area complete, obsolete or wanting; petiolar area semicircular, usually entire but with the basal carina sometimes deficient; apophyses obsolete, spiracles small and subcircular. Scutellum convex and triangular, apically obtuse and rarely pale-marked. Abdomen sessile, dorsally deplanate and somewhat shining, linear or sublanccolate, with the three apical segments becoming gradually narrower; often centrally, or with the central segments apically, red; basal segment a little curved, laterally margined, with more or less elongate and evident discal carinae, and spiracles close to its base; second to fourth segments with epipleurae inflexed and always with two oblique and linear impressions, rising from the apical angles and coalescing at or converging towards the centre of the base; apical ventral segment incised apically and not retracted; terebra varying from a little shorter than the abdomen to much longer than the body; valvulae of ♂ incrassate and apically obtuse, rarely narrower with the apex subacuminate. Legs somewhat slender, nearly always with the hind femora red and very often their tibiae black and white at the base; hind calcaria of unequal length; fifth tarsal joint usually longer than the fourth, their claws generally sparsely and finely but distinctly pectinate, sometimes simple or internally setose. Wings somewhat narrow and not large, with no areolet; first recurrent nervure of hind wings intercepted below the centre.

This genus is instantly known by the very conspicuous oblique abdominal impressions, a feature found also only in *Lycorina* among the Ichneumonidae. Similar linear modifications of the exoskeleton are found in the genus *Bassus*, etc., but in that case they are directly transverse and not duplicated as in this genus. Those species bearing frontal excrescences have been placed by Förster in distinct genera, which are now—forty years after publication—becoming adopted; but the value of such genera, based upon a single feature of no matter how much validity, can have no foundation in Nature when the whole remainder of its parts are identical, especially when intermediate forms (such as *G. parvicornuta* and *G. teres* in the present genus) exist. A distinct genus might, with more propriety, be erected upon the abbreviated petiolar area of the *G. flavonotata*-group!



*Table of Species.*

- (12). 1. Frons distinctly horned.  
 (3). 2. Frons with two horns (DIBLASTO-MORPHA, Först.) . . . . . 1. BICORNIS, *Boie*.  
 (2). 3. Frons with only one horn (CONOBLASTA, Först.).  
 (5). 4. Head laterally parallel; basal segment distinctly bicarinate . . . . . 2. ELONGATA, *Holmgr.*  
 (4). 5. Head posteriorly constricted; basal segment indistinctly bicarinate.  
 (7). 6. Tarsal claws mutic . . . . . 3. MONOCERUS, *Grav.*  
 (6). 7. Tarsal claws distinctly, though often sparsely, pectinate.  
 (9). 8. Metanotal carinae obsolete . . . . . 4. FRONTICORNIS, *Grav.*  
 (8). 9. Metanotal carinae distinct and entire.  
 (11). 10. Frons smooth and nitidulous, with normal horn . . . . . 5. CERATITES, *Grav.*  
 (10). 11. Frons distinctly punctate, with a minute horn . . . . . 6. PARVICORNUTA, *Bridg.*  
 (1). 12. Frons with no horn (GLYPTA, S.S.).  
 (56). 13. Thorax and scutellum black, with at most radical callosities pale.  
 (15). 14. Cheeks half as long again as basal width of mandibles . . . . . 7. GENALIS, *Möll.*  
 (14). 15. Cheeks not longer than basal width of mandibles.  
 (29). 16. Clypeus clothed with long and dense pubescence.  
 (20). 17. Central segments not broader than long.  
 (19). 18. Metathoracic areae obsolete . . . . . 8. RUBICUNDA, *Bridg.*  
 (18). 19. Metathoracic areae distinct and entire . . . . . 9. FEMORATOR, *Desv.*  
 (17). 20. Central segments broader than long.  
 (24). 21. Metathoracic areae obsolete and incomplete.  
 (23). 22. Dull; coxae black . . . . . 10. HAESITATOR, *Grav.*  
 (22). 23. Nitidulous; coxae red . . . . . 11. TROCHANTERATA, *Brid.*  
 (21). 24. Metathoracic areae complete and usually strong.  
 (26). 25. Epistoma tuberculiform; clypeus red . . . . . 12. VULNERATOR, *Grav.*  
 (25). 26. Epistoma normally convex; clypeus often flavescent.  
 (28). 27. Fourth and fifth hind tarsal joints of equal length . . . . . 13. SIMILIS, *Bridg.*  
 (27). 28. Fourth hind tarsal joint much shorter than fifth . . . . . 14. FILICORNIS, *Thoms.*  
 (16). 29. Clypeus not clothed with dense pubescence.  
 (37). 30. Fifth hind tarsal joint not longer than fourth.  
 (32). 31. Metanotal carinae obsolete; front coxae white; size small . . . . . 15. TENUICORNIS, *Thoms.*  
 (31). 32. Metanotal carinae distinct; coxae not white; size normal.  
 (34). 33. Frons impressed; central segments transverse . . . . . 16. RESINANAE, *Htg.*

- (33). 34. Frons not impressed, nor central segments transverse.
- (36). 35. Coxae black; hind tibiae not infusate before their base . . . . . 17. TERES, *Grav.*
- (35). 36. Coxae red; hind tibiae infusate before their base . . . . . 18. PUNCTIFRONS, *Bridg.*
- (30). 37. Fifth hind tarsal joint longer than the fourth.
- (39). 38. Hind tibiae broadly white in the centre . . . . . 19. PEDATA, *Desv.*
- (38). 39. Hind tibiae not centrally white.
- (47). 40. Central segments not broader than long.
- (46). 41. Radical callosities and flagellum beneath not flavescent
- (43). 42. Hind tibiae unicolourous red; terebra as long as body . . . . . 20. SCULPTURATA, *Grav.*
- (42). 43. Hind tibiae apically infusate and basally whitish.
- (45). 44. Coxae red; terebra as long as body . . . . . 21. INCISA, *Grav.*
- (44). 45. Coxae black; terebra as long as abdomen . . . . . 22. ANNULATA, *Bridg.*
- (41). 46. Radical callosities and flagellum beneath flavescent . . . . . 23. NIGRINA, *Desv.*
- (40). 47. Central segments broader than long.
- (53). 48. Hind tibiae with apex and a band before base infusate.
- (50). 49. Abdomen entirely black; terebra  $\frac{2}{3}$  length of abdomen . . . . . 24. PARVICAUDATA, *Bridg.*
- (49). 50. Abdomen broadly red; terebra longer.
- (52). 51. Coxae basally black; terebra as long as body . . . . . 25. LUGUBRINA, *Holmgr.*
- (51). 52. Coxae red; terebra about length of abdomen . . . . . 26. RUFATA, *Bridg.*
- (48). 53. Hind tibiae at most slightly infusate at apex.
- (55). 54. Radical callosities pale; terebra as long as abdomen . . . . . 27. SCALARIS, *Grav.*
- (54). 55. Thorax immaculate; terebra longer than body . . . . . 28. BIFOVEOLATA, *Grav.*
- (13). 56. Thorax and scutellum more or less rufescent or flavidous.
- (62). 57. Scutellum black with flavous marking.
- (61). 58. Oblique abdominal impressions not basally confluent.
- (60). 59. Central segments quadrate and punctate . . . . . 29. FLAVOLINEATA, *Grav.*
- (59). 60. Central segment subtransverse and rugose . . . . . 30. CICATRICOSA, *Ratz.*
- (58). 61. Oblique impressions of elongate segments basally confluent . . . . . 31. EVANESCENS, *Ratz.*
- (57). 62. Scutellum entirely rufescent.
- (64). 63. Face with short pilosity; mesonotum black . . . . . 32. LINEATA, *Desv.*
- (63). 64. Face with elongate pubescence; mesonotum red . . . . . 33. RUFICEPS, *Desv.*

1. *bicornis*, Boie.

*Glypta bicornis*, Boie, Stett. ent. Zeit. 1850, n. 6, p. 216; Desv. Cat. 74, ♂; Thoms. O. E. xiii. 1330, ♂ ♀. *G. corniculata*, Brisch. Nat. Ges. Danz. 1880, p. 115, ♂ ♀.

A somewhat broad, black, not closely nor finely punctate species. Head not strongly constricted posteriorly, with two short, stout, cylindrical and apically bifid horns above the excavate scrobes; face clothed with silvery pubescence; labrum and ♂ mandibles flavous; ♀ with the palpi and apex of clypeus red. Antennae filiform; nearly as long as the body, black and beneath towards the apex testaceous. Thorax rarely with flavous callosities before the radix; metathoracic costae wanting, its notum convex and very strongly punctate; ♀ petiolar area entire. Abdomen cylindrical and hardly narrower than the thorax, pubescent, black; basal segment subsinuate behind the spiracles and nitidulous; the second and third subquadrate, usually with a triangular or pyriform fulvous mark; anal styles of ♂ stout; terebra hardly as long as the abdomen. Legs slender and fulvous; ♂ with the front trochanters and anterior coxae flavous, the posterior trochanters and hind coxae black with their apices pale; ♀ with coxae black; hind tibiae apically, tarsi and rarely apices of femora nigrescent; intermediate tarsi with the joints basally whitish. Wings with the tegulae and stigma fulvous, latter narrow; nervellus intercepted far below its centre. Length, 9—11 mm.

Brischke mentions a variety from Prussia with the palpi, mandibles, clypeus and abdomen red, and the thorax ferrugineous above and below. The second and third segments vary greatly in the extent of the red coloration, which in the ♂ often occupies all but the basal angles as well as sometimes the apex of the fourth, and in the ♀ is confined to part of the second and the apex of the third segment.

This species is instantly distinguished from all the remainder of the genus by the two frontal horns, on account of which Förster erected a new genus, *Diblastomorpha*, for its reception.

It is recorded from Denmark by Thomson. The two co-types of Desvignes' species—he was not aware of Boie's earlier description—are in the British Museum. Mr. R. Adkin has bred both sexes from larvae of *Tortrix pallana*, Hb. (Proc. S. Lond. Soc. 1896, p. 82). I possess a male captured at Giffnock by Mr. A. A. DalGLISH in 1899; and have myself found both sexes, upon several occasions, in very marshy spots, from the middle of July to the end of August, in Barnby Broad and Tuddenham Fen, in Suffolk, by sweeping the long and rank herbage.

2. *elongata*, Holmgr.

*Glypta elongata*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 38; Bridg. Trans. Ent. Soc. 1887, p. 377, ♂; Thoms. O. E. xiii. 1339, ♂ ♀.

A somewhat shining and punctate species, black with fine pubescence. Head not posteriorly constricted, its sides subparallel and vertex broad; frons unidentate above the scrobes; palpi and apex of the clypeus testaceous. Antennae with the flagellum ferrugineous and darker above; about half the length of the body in ♀, somewhat more elongate in ♂; basal flagellar joint longer than second. Thorax black with sometimes a pale callosity before the radix; metathorax subscabriculous and fully areated in ♂, evenly punctate with the costulae and basal costae alone

distinct in ♀; petiolar area very short. Abdomen of ♀ rufescent, apically and sometimes also basally black-marked; of ♂ sometimes with only the margins of the segments obscurely red; basal segment longer than its apical breadth, with the discal carinae distinct to the centre and the sides slightly sinuate beyond the spiracles; the second to the fourth quadrate or slightly longer than broad, deeply sculptured; terebra as long as the abdomen. Legs red; hind tibiae apically nigrescent, their tarsi dull ferrugineous with the base of the joints paler; ♂ with coxae castaneous, apices of the hind femora usually, tibiae and the tarsal joints, together with occasionally the base of the tibiae, infusate; tarsal claws stout and hardly pectinate. Wings slightly infumate with the stigma dull stramineous, radix and tegulae fulvescent-flavous. Length, 8 mm.

This species is somewhat similar to *G. fronticornis* and *G. ceratites*, but differs widely in the much more elongate body, the less posteriorly constricted head, the strongly buccate temples, the longer than broad basal segment with short and distinct carinae and in the transverse anal nervure being distinctly intercepted only a little below its centre. Bridgman says both sexes sometimes have only the margins of the abdominal segments obscurely red; and Thomson adds that the body is more strongly elongate and the flagellum less apically attenuate than in *G. monocerus*.

It has been found in several localities in Scandinavia, where it is, however, said to be rare. With us it appears to be widely distributed and uncommon; it has been captured at Brundall, near Norwich, in July, 1881; at Shere in Surrey and bred by Fletcher in July, 1886, from larvae of *Bactra lanceolata* at Worthing. S. Edwards captured a specimen at Lynton in 1890; E. R. Bankes one in the Isle of Purbeck, Dorset, at the end of July, 1894; and W. Evans another at Luffness in the middle of June, 1898. I took a female by sweeping rushes at Dunwich in the middle of July, 1897, others in the neighbouring Easton and Covehithe Broads in early September, and a male in the same situation at Brandon in Suffolk, at the beginning of the same month, 1903; I have also found the male at Matley Bog in the New Forest, in the middle of June.

### 3. *monocerus*, Grav.

*Glypta monoceros*, Gr. I.E. iii. 16, ♂; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 37; Tasch. Zeits. Ges. Nat. 1863, p. 275; Thoms. O.E. xiii. 1338, ♂ ♀.

A shining species with red abdomen. Head short and strongly narrowed behind the eyes; vertex broad; frons acuminately unidentate centrally above the scrobes; palpi, labrum and apex of clypeus testaceous. Antennae filiform, apically attenuate and in ♀ a little shorter than the body; pale ferrugineous and darker above with the scape black. Thorax with testaceous dots immediately before the radicles; metathorax with five subcomplete upper areae, which become obsolete beyond the prominent costulae; petiolar area short, strongly carinate basally; apophyses minute. Abdomen red with the seventh, sixth or even fifth and margin of the preceding segment black; basal segment a little elevated, punctate and laterally margined, with short discal carinae and often basally infusate; the second to fourth punctate and nitidulous, remainder pubescent and smoother; terebra only slightly longer than abdomen with its valvulae stout and shortly pilose; anal styles of ♂ short, stout, pilose and black with a small acute appendix on either side. Legs somewhat slender, red; of ♂ with the front coxae and trochanters flavescent; hind

tibiae apically infusate above, and the tarsal claws elongate and not or very obsoletely pectinate. Wings normally broad and slightly hyaline with the stigma dull stramineous, radix and tegulae flavous; radial nervure apically straight; transverse anal nervure indistinct and intercepted far below the centre. Length, 6—8 mm.

This species is said by Gravenhorst to be similar to *G. subcornuta*, but with the antennae and legs a little longer and more slender. Holmgren gives it as very distinct, not only in the colour of the abdomen and legs, but also in its tarsal conformation. Bridgman says the strongly constricted head and nude tarsal claws are very distinctive.

It is said to occur at the beginning of August, and to be rare in Sweden. In Britain it does not seem to be of more frequent occurrence than the last species, though Bridgman has recorded it from Brundall in Norfolk; and Bignell has bred it, at the end of June, from *Tortrix costana* in south Devon. I have seen males taken at Plumstead early in July and a female at Harting in Sussex at the end of August, 1899, by Beaumont; and Dr. Capron found both sexes at Shere in Surrey.

#### 4. fronticornis, Grav.

*Glypta fronticornis*, Gr. I.E. iii. 17, ♂; Holmgr. Sv. Ak. Handl. 1854, p. 96, ♀; *lib. cit.* 1860, n. 10, p. 38; Tasch. Zeits. Ges. Nat. 1863, p. 275; Thoms. O.E. xiii. 1336, ♂ ♀; Voll. Pinac. pl. xiii. fig. 5.

Black and somewhat shining. Head posteriorly constricted; frons anteriorly subexcavate with one small acuminate tooth; palpi and often apex of the prominent and discreted clypeus testaceous; face strongly punctate and pilose with the epistoma subglabrous and tuberculiformly convex. Antennae half again longer than the body; flagellum ferruginous and darker above, a little incrassate basally; scape black. Thorax gibbulous, black with pale callosity before the radix; metathoracic areola basally complete with the costulae obsolete; petiolar area short, subvertical and basally carinate. Abdomen linear-cylindrical, a little narrower and twice longer than the thorax, pale red or black; basal segment except the margin broadly, and usually three sometimes confluent basal marks on the second to fifth, apex and basal marks on sixth and whole of seventh segments, black; terebra slender and nearly as long as the abdomen. Legs slender and fulvous with the coxae sometimes, in ♂ generally, infusate or black; hind tibiae apically and their tarsi above infusate, joints of the latter basally pale; tarsal claws remotely but distinctly pectinate. Wings flavescent-hyaline or slightly infumate; stigma dull, and radix and tegulae clear, stramineous throughout; transverse anal nervure indistinctly intercepted far below the centre. Length, 5—7 mm.

This species has the facies of *G. teres*, with the frons horned and the antennae a little shorter and stouter; it is also said to be very like *G. monocerus*, but the colour of the abdomen and legs, and especially the tarsal conformation, are distinctive; as also, says Thomson, are the shorter antennae and less distinct thoracic costae. It is extremely like the next species, but the metanotal carinae are weaker and the terebra constantly longer.

*G. fronticornis* is not infrequent in grassy places on the Continent, but Bridgman in 1889 said that he did not feel at all sure that it had any right to a position in the British list: he had never seen an indigenous

example and suggests that *G. elongata* had previously been mistaken for it (Trans. Norf. Soc. v, p. 67). I possess three females and a male, which differ slightly from the above description in having the head only a little constricted posteriorly, the antennae not longer than the body, and the terebra slightly longer than the abdomen; they were captured by Rev. E. N. Bloomfield near Hastings, Mr. Albert Piffard at Felden in Herts and a pair by Mr. W. Evans at Loch Ard in Perthshire in the middle of July, 1906. The female has also occurred to me at Southwold on *Heracleum* flowers in early September and at Rookley Wilderness in the Isle of Wight at the end of June, 1907; Butler has also taken the same sex at Hastings; and Bankes bred one during the first week of June, 1903, at Corfe Castle in Dorset, "presumably from *Clepsia rusticana*, Tr., though this seems to me a small host for so large a parasite."

### 5. *ceratites*, Grav.

*Glypta ceratites*, Gr. I.E. iii. 18, excl. var. 2; Holmgr. Sv. Ak. Handl. 1854, p. 96; lib. cit. 1860, n. 10, p. 38; Tasch. Zeits. Ges. Nat. 1863, p. 275; Thoms. O.E. xiii. 1336, ♂ ♀; Voll. Pinac. pl. xiii, f. 4. Var., Bridg. Trans. Ent. Soc. 1886, p. 366.

Elongate and black, with the three basal segments apically castaneous. Head constricted posteriorly; frons smooth and nitidulous, bearing a single cylindrical horn, which is smaller in the male; palpi testaceous, of ♀ sometimes infusate; labrum and apex of clypeus rufescent. Antennae slender and filiform; of ♂ as long as body, fulvous and sometimes darker above, of ♀ infusate and rather shorter than the body; flagellum with the basal joint a little longer than the second, and the apical ones submoniliform and discreted. Thorax subcylindrical, black with a stramineous callosity before the radix; pleurae strongly punctate; metathorax somewhat strongly punctate with the dentiparal areae generally laterally open, the costulae and basal areae distinct. Abdomen somewhat longer and narrower than the head and thorax, deplanate and cylindrical; black with the incisures of the three basal segments castaneous or in ♀ rarely flavidous; basal segment punctate and somewhat convex, gradually contracted basally with the discal carinae, especially in ♀, very short or almost wanting; central segments punctate and subquadrate; terebra not as long as abdomen. Legs slender, fulvous or with coxae sometimes nigrescent; of ♂ with the front coxae and trochanters pale, of ♀ with the coxae rarely basally black; hind tibiae apically and before the whitish base infusate, as also are their tarsi though with the joints evidently whitish basally; hind calcaria hardly reaching beyond centre of metatarsus; tarsal claws remotely but evidently pectinate. Wings hyaline or slightly infumate, darker in ♀; stigma narrow and dull stramineous or, in ♀, piceous; radix and tegulae whitish; transverse anal nervure indistinctly intercepted far below the centre. Length, 5—7½ mm.

It is said to be similar to *G. teres*, but with the frons horned, the terebra shorter and antennae a little longer. Bridgman tells us it differs from *G. parvicornuta* in the glabrous frons bearing a horn of normal size. He mentions a variety with the extreme base of the hind tibiae infusate; and Gravenhorst took another in May which had no rufescent colouration on the abdomen and hind tibiae.

This species occurs not uncommonly on umbelliferous flowers in Sweden from June to August. It has been bred, according to Bridgman, from

*Sericoris conchana*, *Diurnea fagella* and *Phycis betulae*; about forty specimens of his variety were raised by Fletcher (*l.c. supra*) from Rannoch *Euchromia flammeana*, as well as captured at Sunderland. This species is by far the commonest of those bearing a frontal horn in Britain; it has been captured at Shere (Capron), Bury St. Edmunds (Tuck), Guestling (Bloomfield), on heather at Selby in Yorks (Ash), commonly in Norfolk (Bridgman), Dumbarton (Malloch), Newton Abbot in Devon (Hamm), Little Moor in Wigtonshire (Gordon), and St. Issey in Cornwall (Davies). Miss Alderson bred a male on 11th July, 1900, from the larva of *Batodes angustiorana*, Hw., feeding on yew, at Worksop; Bignell in south Devon, from *Ephippiphora nigrocostana* in the middle of June—a very early date; and in Germany Taschenburg has raised it from the pupa of *Earias clorana* and Brischke from *Nephopteryx vacciniella*. It is abundant upon the flowers of *Angelica sylvestris* on the banks of streams in August; and in July, though very rarely in June, on those of *Heracleum sphondylium*; the females remain abroad till nearly the middle of September. I have met with it in Suffolk at Foxhall, Finborough Park, Henstead marshes, Claydon bridge, Beccles, Tuddenham Fen, Barnby Broad, and Bramford; at Kirtling in Cambridgeshire (my only June record); and at Cromer in Norfolk.

#### 6. *parvicornuta*, Bridg.

*Glypta ceratites*, var. 2, Gr. I.E. iii. 20, ♂ ♀. *G. parvicornuta*, Bridg. Trans. Ent. Soc. 1886, p. 367, ♀; cf. Trans. Norf. Soc. v. 69.

Head obliquely constricted behind the eyes, frons somewhat closely and coarsely punctate, with a minute horn above the scrobes; clypeus pale and very sparsely pubescent. Antennae longer than half the body, filiform and entirely black throughout. Thorax of male with a stramineous dot before the radix, of ♀ immaculate; mesonotal notauli anteriorly distinct, mesopleura punctate; metathoracic areae complete, petiolar area smooth and nitidulous. Abdomen linear-cylindrical, slightly longer than the head and thorax, and as broad as the latter; black with the incisures rarely rufescent; carinae of the basal segment distinct and reaching the centre; second and third segments longer than broad; terebra as long as the abdomen with the spicula testaceous. Legs red; hind tarsi, except the base of the joints, and their tibiae at apex and before their whitish base, infuscate; tarsal claws distinctly pectinate. Wings subhyaline, with the tegulae pale and the stigma pale piceous; nervellus intercepted one-fourth from the bottom. Length, 6—7 mm.

This species is said by Bridgman to be very like *G. ceratites* and *G. consimilis* in its facies, but to differ in having the frons more coarsely punctate and armed with a much shorter horn.

Bonnelli took both sexes in Piedmont; and Mr. F. A. Atmore has bred a single female from *Acrobasis consociella* at Kings Lynn, in Norfolk. I possess a female captured by Mr. Wilson Saunders at Greenings in Surrey in June, 1871, and took another myself in Tuddenham Fen, Suffolk, late in August, 1905.

#### 7. *genalis*, Möll.

*Glypta genalis*, Möller, Ent. Tidskr. iv., p. 95; Thoms. O.E. xiii. 1331, ♂ ♀.

A somewhat curved, black, shining and strongly punctate species. Head with the cheeks below the eyes, half as long again as the basal width of the black mandibles; frons mutic and strongly, with the face

more finely, punctate; genal costa sinuate; clypeus of ♂ sometimes pale marked. Antennae black, with the flagellum of the male rufescent beneath. Thorax black with a pale pronotal mark before the tegulae and strongly, with the mesonotum more sparsely and finely, punctate; metathoracic costae strongly defined. Scutellum immaculate. Abdomen shining, less coarsely punctate, with infusate pubescence; basal segment short and convex, with the carinae not elongate; the second to fourth segments transverse; terebra nearly as long as the abdomen. Legs somewhat stout, red with the coxae and trochanters, apices of the hind tibiae and their tarsi, nigrescent. Wings with the tegulae black, though usually paler in ♂. Length, 6 mm.

The peculiarly beak-like production of the face will at once distinguish this apparently rare species from all the others of the present genus.

Bridgman tells us (Trans. Norf. Soc. v, p. 72) that Mr. E. A. Atmore has bred this species from *Tortrix viburnana*, *T. adjunctana* and *T. decretana*, probably at Kings Lynn, in Norfolk. The only specimen I have seen is a female in Marshall's collection in the British Museum; it is labelled by Billups "From *Taeniocampa miniosa*. Mr. Fenn," and on the same card is its own transparent papyraceous cocoon, which is cylindrical and nearly colourless.

### 8. *rubicunda*, Bridg.

*Glypta rubicunda*, Bridg. E. M. M. 1890, p. 208, ♂ ♀; cf. Trans. Norf. Soc. v. p. 70.

Somewhat shining and black. Head transverse and somewhat obliquely constricted behind the eyes; clypeus with long and dense pubescence. Antennae about two-thirds the length of the body. Thorax finely punctate and immaculate; metathoracic areae obsolete or wanting. Abdomen elongate and slender, dull, very finely punctate and as broad as the thorax; of ♀ with the three basal segments, of ♂ with at most the second sometimes, dull red; basal segment nearly twice, second and third about one-fourth, longer than broad; oblique impressions shallow and extending only to about two-thirds the length of the segment, those on the fourth subobsolete; terebra very little longer than the abdomen. Legs red with the coxae and trochanters black; hind tarsi and the apices of their tibiae nigrescent, with the base of the former rufescent. Wings with the tegulae flavous; stigma rufescent, with a narrow infusate margin; nervellus nearly straight and intercepted below the centre. Length, 12—13 mm.

This is a very distinct species and may be easily recognised by its pubescent clypeus, the length of its abdominal segments and the colour of both legs and abdomen.

The only known examples of this species appear to be those of both sexes bred by Mr. G. Elisha from *Argyrolepis maritima*, which are in the Bridgman collection at Norwich.

### 9. *femorator*, Desv.

*Glypta femorator*, Desv. Cat. 73, ♂; cf. Bridg. Trans. Norf. Soc. v. 71.

Head transverse, but not strongly narrowed behind the eyes; face clothed with elongate grey pilosity, epistoma prominent; mandibles entirely black, and not apically flavescent; clypeus flavescent with elongate griseous pubescence, cheeks longer than width of mandibles at base; palpi testaceous with the base black. Antennae hardly shorter than the



body, ferrugineous beneath with the scape and annellus entirely black. Thorax with a small, pale callosity before the radix, notauli wanting; metathorax scabriculous, areola elongate with distinct costulae; petiolar area short and well defined with no apophyses; sternauli short and horizontal. Abdomen dull, coarsely punctate and whitely pilose; three basal segments apically rufescent; first segment bicarinate nearly to its apex and laterally margined throughout, with the apical angles subrectangular. Legs ochraceous, with the flavous anterior coxae basally black; hind legs nigrescent with the femora beneath and centre of their tibiae fulvous; hind tibiae basally white; all the trochanters flavidous, the posterior basally nigrescent. Wings ample; tegulae stramineous, stigma fulvous, fenestrae entire; nervellus intercepted only slightly below the centre. Length, 7 mm.

Bridgman says that this is a "very easily recognised" species; indeed, the black hind femora, if their colour prove to be constant, will distinguish it from all others of the genus; he evidently had no personal acquaintance with it, however, since he groups it with those having the clypeus subglabrous.

From the specimen mentioned below, I am able to show some variability of this species' coloration. In this case the antennae are not at all rufescent below, the radical callosities are immaculate, the stigma apically infusate, all the coxae are only narrowly pale apically with their trochanters basally infusate; the hind femora only apically beneath, and their tibiae centrally, are dull ferrugineous, with the latter nigrescent nearly to the base. The female appears to be still unknown.

The single imperfect (type) male in the National Collection is from Desvignes' collection and is labelled "Dsvgn. 68. 52"; from it I have been enabled to somewhat amplify the original description. Late in the afternoon of 14th June, 1900, I swept one specimen of this species from long grass on the margin of Stanstead Wood, near Sudbury, Suffolk; it agrees entirely with the type specimen, except in the points indicated above. A second, probably identical, male was swept at the same time and place.

#### 10. *haesitator*, Grav.

*Glypta haesitator*, Gr. I. E. iii. 12; Holmgr. Sv. Ak. Handl. 1854, p. 96, ♀; lib. cit. 1860, n. 10, p. 42; Tasch. Zeits. Ges. Nat. 1863, p. 276; Thoms. O. E. xiii. 1351, ♂ ♀.

Head with the palpi dull white; clypeus apically ferrugineous with long and dense fulvescent pilosity; cheeks not elongate nor frons cornuted. Antennae apically somewhat slender; of ♂ as long as the body, sometimes ferrugineous beneath, with the scape entirely black; of ♀ shorter than the body with the apex subrufescent beneath. Thorax cylindrical and convex, immaculate; mesonotum dull and coarsely punctate, discally deplanate; metathorax with complete upper areae only as far as the costulae. Abdomen fusiform-cylindrical, of ♂ a little longer than, of ♀ as long as, head and thorax; the three and sometimes four basal segments with the apical margin castaneous, at least discally, second and third broader than long; terebra distinctly a little shorter than abdomen. Legs fulvous with the coxae and base of trochanters black; intermediate tarsi with the joints apically infusate; hind tibiae apically and before the white base black, their tarsi nigrescent with (♂) the joints basally whitish or

(♀) the first joint alone broadly white basally. Wings somewhat clouded, stigma dull stramineous, tegulae and radix very pale stramineous. Length, 4—7 mm.

The size and outline are similar to those of *G. mensurator*, but the ♂ is, like that of *G. lers*, more slender; the ♀ has the antennae a little longer and the shorter terebra will also distinguish it from *G. vulnerator*. It is, too, much smaller than the last-named, with the body considerably duller, the metathoracic areae incomplete, the head and thorax shorter and the pedal colour different. Thomson adds that the costulae of the ♀ are wanting and of the ♂ obsolete, basal segment a little longer with the spiracles not prominent and the sides not narrowed.

Both sexes are said to be found on flowers on the Continent in July, in which month it is not uncommon with us though usually found flying about hedges. Dalglish has taken it at Bishopton in Scotland, Elliott at Askrigg in Yorks, I have found it in a greenhouse at Ryde in the Isle of Wight, on an aspen leaf at Monks' Soham in the middle of August and once early in June at Belstead in Suffolk; Bridgman records it from Mousehold and Lynn in Norfolk. Brischke bred it in Prussia from *Grapholitha nebrilana*; Bignell in South Devon from *Spilonota ocellana* at the end of June; and Lord Walsingham from a *Tortrix* larva feeding on *Myrica gale* (Entom. 1883, p. 67). I have seen a female in Butler's collection from Wymondley, in Herts.

### 11. *trochanterata*, Bridg.

*Glypta lineata*, var. 1, Bridg. Trans. Ent. Soc. 1884, p. 433, ♀ (nec Desv.). *G. trochanterata*, Bridg. lib. cit. 1886, p. 368; Thoms. O. E. xiii. 1352, ♂ ♀.

An elongate and nitidulous species with fine pubescence. Head constricted behind the eyes; frons mutic and somewhat sparsely punctate; clypeus densely pubescent, apically piceous and hardly discreted; face finely punctate with long pilosity and prominent epistoma; mandibles basally smooth; palpi pale. Antennae of ♂ as long as, of ♀ three-quarters the length of, body. Thorax immaculate; mesonotum somewhat confluent punctate, not discally deplanate; metathoracic areae obsolete or wanting, the basal laterally indicated; petiolar area basally indistinctly costate. Abdomen black with the apices of the three basal segments distinctly red; basal segment hardly longer than broad, coarsely punctate, with carinae at base only; second and third segments transverse, dull; anus somewhat nitidulous; terebra about as long as abdomen. Legs red; hind trochanters entirely, the anterior sometimes more or less, black; hind tibiae apically and before the whitish base infusate, their tarsi concolorous with the base of the joints pale; tarsal claws coarsely and very sparsely pectinate. Wings with the tegulae stramineous and stigma subinfusate; transverse anal nervure intercepted below the centre, and about one-fourth from the bottom. Length, 6 mm.

Bridgman says that this species is of the same size and shape as *G. lineata*, with which also its clypeal pubescence agrees, but that the thorax and hind trochanters are entirely black, the metathoracic areae are less distinct and the transverse anal nervure is intercepted further below the centre. It differs from *G. filicornis* in the rather shorter terebra, obsolete metathoracic costae, the wanting ♀ petiolar area, red coxae, black trochanters and shorter calcaria.

Both sexes of this species, which is indicated from England alone by Thomson, were annually swept from *Calluna erica* in the middle of June, by Bridgman, at Mousehold, near Norwich (Trans. Norf. Soc. v, p. 63). It is by no means rare with us, though hitherto much mixed with the last species; Dr. Capron has found it at Shere in Surrey and Mr. Piffard early in June at Felden in Herts; I swept a female on the banks of the Gipping at Ipswich in the middle of June, 1895, and took another (with the whole of the second and third, as well as base of the fourth, segments red) on the flowers of *Smyrnium olusatrum* at Dunwich in Suffolk early in July, 1900. It has also occurred to me at Shalfleet, in the Isle of Wight, at the end of June, 1907.

### 12. *vulnerator*, Grav.

*Glypta vulnerator*, Gr. I.E. iii. 11; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 42; Tasch. Zeits. Ges. Nat. 1863, p. 276; Thoms. O.E. xiii. 1350, ♂ ♀.

A stout, curved and somewhat shining species. Head with a strongly prominent tubercle in the centre of the face, but no horn; cheeks not elongate, nor genal costa sinuate; labrum generally ferrugineous; palpi infusate, though sometimes stramineous; clypeus apically rufescent with long and dense grey pilosity throughout; mandibles basally smooth. Antennae filiform and apically attenuate, half as long again as the body, infusate and sometimes ferrugineous beneath; scape always black. Thorax immaculate; pleurae and metathorax strongly punctate, the latter with five complete upper areae and the petiolar area elongate. Abdomen elongate-ovate, black with the three basal segments rosy-castaneous apically or in triangular patches; basal segment short and broad, laterally narrowed before the dentately prominent spiracles, with two distinct discal carinae; the second to the fourth transverse, coarsely alutaceo-punctate; terebra as long as the body. Legs somewhat stout, fulvous with the coxae and trochanters black; hind tarsi, which sometimes have their joints only very narrowly white basally, and the apex and before the white base of their tibiae, nigrescent. Wings normal and slightly clouded; stigma and radix stramineous, tegulae ferrugineous or piceous. Length, 7—8 mm.

Gravenhorst says this species is very like *G. mensurator*; and that it differs from *G. teres* in its size and stouter abdomen. From *G. haesitator* it is primarily distinguished by the more narrowly white-banded tarsi and longer terebra.

It occurs on umbelliferous flowers in July and Bridgman records it as bred by Atmore at Kings Lynn in Norfolk from *Catoptria scopoliانا*. It has also been bred in France from *Cochylis hilarana* by M. Perris (Giraud); and in Britain by Elisha, though somewhat doubtfully, from *Semasia rufillana* (Entom. 1884, p. 68). It was captured at Norwich by Bridgman; and I have seen a male taken at Polton, near Edinburgh, in the middle of June by Evans.

### 13. *similis*, Bridg.

*Glypta similis*, Bridg. Trans. Ent. Soc. 1886, p. 367, ♂ ♀; cf. Trans. Norf. Soc. v. p. 70.

Head broader than long constricted behind the eyes, with the sides somewhat rounded; clypeus flavous, with long and dense pubescence; frons mutic and coarsely punctate, with grey hairs; face finely punctate with long, scattered grey pilosity and prominent epistoma. Antennae of

♂ not quite as long as, of ♀ one-third shorter than, the body; flagellum black above and rufescent beneath. Thorax immaculate, mesonotum strongly and evenly punctate throughout; metathoracic basal areae shining, complete and distinct; lateral areae somewhat sparsely punctate; areola subglabrous with the costulae fine and apical areae wanting; petiolar area not short, its basal carina indistinct. Abdomen black with the incisures rufescent; first segment with the carinae basally distinct and becoming obsolete two-thirds from the base; the second and third segments a little broader than long; terebra about as long as, or slightly longer than, the abdomen. Legs red with the hind tibiae infusate at apex and before the whitish base, their tarsi concolorous with the base of the joints pale, and the fourth and fifth joints of equal length; claws pectinate. Wings with the tegulae stramineous and stigma pale testaceous; transverse anal nervure intercepted about one-fourth from the bottom. Length, 9 mm.

This species is very similar to *G. resinanae*, but the head is broader, the frons coarsely punctate, the clypeus densely pubescent and the stigma paler.

Both sexes, Bridgman tells us (*l.c.*), have been bred at Worthing by Mr. W. H. B. Fletcher from *Ephippiphora scutellana*, and are probably in the former's collection at Norwich. I possess three females of this species, two of which I took in a very wet part of Surlingham marsh in the Norfolk Broads on 10th June, 1901, and one was bred from *Ephippiphora grandaevana* by Mr. E. R. Banks at Hartlepool on 14th July, 1899. There is a female in Bignell's collection from *Coccyx strabilella* in spruce fir cones collected at Rannoch.

#### 14. *flicornis*, Thoms.

*Glypta flicornis*, Thoms. O.E. xiii. 1351, ♂ ♀; cf. Bridg. Trans. Norf. Soc. v. 70.

Somewhat shining and a little curved. Head constricted behind the eyes; clypeus apically covered with long and dense pubescence; frons mutic and cheeks not elongate. Antennae of ♀ hardly attenuate apically. Thorax immaculate; metathoracic costae not very distinct. Abdomen not broad; basal segment apically or nearly entirely rosy, with the dorsal carinae distinct and extending nearly to its apex; second to fourth segments only very slightly broader than long; terebra almost longer than the abdomen. Legs not very stout; coxae and trochanters red or basally nigrescent, hind tibiae infusate at apex and before the base; hind tarsi with the three first joints basally pale testaceous, the fifth much longer than the fourth. Wings normal. Length, 5—6 mm.

This species is closely allied with *G. vulnerator* and *G. haesitator*. It appears to differ from *G. lineata* only in the more distinct and elongate petiolar carinae.

Mr. Fletcher first found this species in Britain (Trans. Ent. Soc. 1889, p. 436) having bred a female from birch catkins, doubtless containing microlepidopterous larvae, probably at Worthing. I have not seen it.

#### 15. *tenuicornis*, Thoms.

*Glypta tenuicornis*, Thoms. O.E. xiii. 1340, ♀.

The smallest species of the genus. Head rounded behind the eyes with the vertex not broad; frons mutic, convex and obsoletely punctate;

epistoma tuberculately prominent; clypeus not pubescent, discreted and stramineous, with the mandibles weak and usually concolorous; peristomium small; cheeks not elongate, nor genal costa sinuate. Antennae nearly as long as the body with the flagellum slender, filiform and black. Thorax black with a white callosity before the radix; mesopleurae shining and nearly smooth; areola subobsolete. Scutellum normal and black. Abdomen nearly parallel-sided, pubescent and densely but superficially punctate; basal segment slightly longer than broad and apically rectangular, with the discal carinae short; second to fourth a little transverse, with the oblique impressions not basally coalescent; terebra a little longer than the abdomen. Legs fulvous and slender; coxae and trochanters black, with the anterior trochanterelli and apices of the front coxae white; hind tarsi, tibiae and sometimes apices of their femora nigrescent, the tibiae basally pale and centrally obscurely rufescent; calcaria short and claws very small; fifth hind tarsal joint not longer than the penultimate. Wings hyaline with the tegulae white; radix emitted from centre of the luteous and somewhat broad stigma, its apical abscissa slightly curved and nearly double the length of the basal; lower angle of discoidal cell subacute; fenestra not broad.

♂ differs from the above ♀ description only in having the mandibles and palpi always stramineous; antennae a little longer than the body, nearly entirely dull red with the scape stramineous beneath; basal segment longer, and the three following quadrate with the apical half of each clear orange; anterior coxae and all the trochanters entirely white, with the nigrescent markings of the hind legs less pronounced. Length, ♂ ♀ 4—5½ mm.

At once known from all our other species by its small size.

Thomson described this small female from Sweden and Munich; but he did not know the male, which is here for the first time brought forward. In Dr. Capron's collection, now in my possession, are one female and four males of this species, which has not hitherto been noted in Britain; they were probably captured about Shere in Surrey.

### 16. *resinanae*, Hartig.

*Glypta resinanae*, Htg. Jahresb. 1837, p. 267; Ratz. Ichn. d. Forst. i. 121, pl. i, fig. 20; Tasch. Zeits. Ges. Nat. 1863, p. 277; Thoms. O.E. xiii. 1340, ♂ ♀. *G. consimilis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 40, ♂ ♀ (*nec* Tasch.).

Head circularly constricted behind the eyes, with the occipital line arcuate; frons convex and punctate, not cornuted; clypeus with no very dense pubescence and often pale; epistoma convex, cheeks subbuccate but not elongate. Antennae black, with the flagellum filiform and in ♂ apically attenuate. Thorax immaculate, cylindrical, with the pleurae shining and punctate; metathoracic costae distinct; petiolar area not short. Abdomen dull and densely pubescent, of ♀ more obsoletely punctate; basal segment rather longer than apically broad, strongly punctate, with the second to fourth segments transverse and subcastaneous apically; terebra a little longer than the abdomen. Legs somewhat slender, red with the hind femora and tibiae at apex, and the latter also before the white base, infusate; ♀ with the hind trochanters infusate, ♂ with the coxae and trochanters black; fifth joint of the slender hind tarsi not longer than the fourth, the claws small and not pectinate. Wings with the tegulae stramineous. Length, 7 mm.

This species differs from *G. teres* in its transverse central abdominal segments. I follow Thomson in synonymising *G. resinanae* with *G. consimilis* of Holmgren, although in a note (O.E. 2128) he says that Holmgren's *Glyptae* were so entirely incorrectly named that he could gain no information therefrom respecting *G. teres*, *consimilis* and other species.

Bred from *Retinia resinana* in Prussia by Brischke; and at Kings Lynn in Norfolk by Atmore, as well as by Barrett, from *Retinia turionanae* (Trans. Norf. Soc. v, p. 72), Kirchner also mentions the latter host on the Continent (Cat. 102). I have seen a female of this species, taken at Charlbury in the middle of June, by Hamm. Bridgman records (Entom. 1884, p. 71) *G. consimilis* as bred from *Ephippiphora scutulana* by Fletcher of Worthing. Banks has given me a male bred at Brighton in 1906, from *Parasia metzneriella*, Stt.; and I possess two females, found by Tuck at Tostock in Suffolk and Miss Alderson at Thorne in Yorks, differing in nothing but the terebral length which is not greater than that of the abdomen.

### 17. *teres*, Grav.

*Glypta teres*, Gr. I.E. iii. 8; excl. var. 1, ♂; Zett. I.L. 376; Thoms. O. E. xiii. 1339 et xix. 2128, ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 40; Tasch. Zeits. Ges. Nat. 1863, p. 277, ♂ ♀ (nec Ratz.).

A linear, black and shining species. Head of ♀ shorter and more strongly constricted behind the eyes than in ♂; frons punctate with a transverse, subrugulose impression above the scrobes, but no horn; labrum dull ferrugineous, palpi subtestaceous; clypeus not covered with dense pubescence. Antennae subfiliform, apically attenuate, black; of ♀ half the length of, of ♂ nearly as long as, the body; often ferrugineous beneath. Thorax cylindrical and immaculate; metanotum strongly punctate, with five subcomplete areae, of which the areola is hexagonal with the base and apex truncate. Abdomen narrow, cylindrical, alutaciously punctate and dull, a little longer and narrower than the head and thorax; the three basal segments or only the second and third rarely with the incisures rufescent, the latter never broader than long; basal segment laterally marginate, with distinct carinae hardly extending beyond its centre and the apical angles obtuse; terebra as long as, or slightly longer than, abdomen with the spicula castaneous. Legs somewhat slender, fulvous-red with the coxae and base of the trochanters black; the slender hind tarsi entirely and apices of their tibiae infuscate, the latter generally basally pale with calcaria of equal length. Wings normal, hyaline with the radix stramineous, stigma subtestaceous and the tegulae infuscate or red. Length, 5—7 mm.

The ♂ differs in having the antennae as long as the body, infuscate with the under side ferrugineous, the legs paler and the abdomen a little longer.

That Gravenhorst's second and third varieties belong to this species is doubtful, since the former is three and three-quarter lines in length with the hind tibiae basally flavescent and the antennae not paler beneath; and the latter is more slender than the typical form with the mouth, stigma, tegulae and legs stramineous-testaceous, the apices of the hind femora and a band before the white bases of their tibiae nigrescent; his fourth variety, a ♀, has the mouth subtestaceous, antennae not paler

beneath, thorax with a somewhat elongate flavous callosity and the trochanters red.

This species is very similar to *G. consimilis*, from which it differs, besides the colour of the legs and wings, in having the second and third segments longer than broad. The frontal excrescence appears to render the present species intermediate between those with and without a horn in that position.

Gravenhorst records that Nees von Esenbeck took the former's typical male *in cop.* with a female *G. bifoveolata*; he had himself also found the two species together though never *in cop.* Lands End district (Maquand), Norwich (Bridgman), Theddlethorpe, Lincs., in July (Gibbs). Goureau has, according to Dours (Cat. 65) bred it from *Anacamptis temerella*.

### 18. *punctifrons*, Bridg.

*Glypta punctifrons*, Bridg. Trans. Norf. Soc. 1889, p. 70, ♂.

Head black with the cheeks below the eyes scarcely, if at all, longer than the width of the base of the mandibles; clypeus not clothed with long and dense pubescence; frons with no horn. Antennae with scape not flavous beneath. Thorax immaculate. Abdomen with the second and third segments not transverse. Legs with all the coxae red; hind tibiae biannulated, their base and that of the tarsal joints pale; fifth hind tarsal joint not longer than the fourth.

A species is thus shortly diagnosed by Bridgman (*loc. cit.*) under the name *G. punctifrons*, Thoms.; but he remarks, on introducing it into our fauna (Trans. Ent. Soc. 1889, p. 436), that he does not know where it is described. As a matter of fact, no species of this genus has been elsewhere mentioned under such a name and the present must, consequently, be attributed to Bridgman, as is done by Schmiedeknecht, who copies Bridgman's table of this genus, in which is a bad fault towards the end.

This male is said to differ from *G. flavipes* (*femorator*), Desv., in having the front coxae and the scape not flavous beneath and the clypeus not densely pubescent: it appears to me to differ from *G. teres* is nothing but the coxal and hind tibial colour, and is probably no more than a variety of that species. No female has yet been assigned to it.

"This was bred by Mr. W. H. B. Fletcher ex *Antithesia dimidiata* from Rannock."

### 19. *pedata*, Desv.

*Glypta pedata*, Desv. Cat. 74, ♀ (? ♂); Thoms. O.E. xiii. 1348, ♀; cf. Bridg. Trans. Norf. Soc. v. 70, ♂ ♀. *G. pictipes*, Tasch. Zeits. Ges. Nat. 1863, p. 276, ♀; Thoms. O.E. xiii. 1347, ♂ ♀.

Head transverse and somewhat narrow behind the eyes; face distinctly punctate with very short pubescence, epistoma prominent; clypeus sparsely pubescent, convex and, like the apices of the mandibles, castaneous; frons mutic, strongly and distinctly punctate; palpi flavous, cheeks normal. Antennae distinctly longer than half the body; black, with the flagellum ferrugineous beneath. Thorax black with flavous callosities before the radices; mesopleurae evenly and distinctly punctate; metathorax convex, coarsely but distinctly punctate, with the areola elongate and apically indeterminate. Scutellum black, rarely (as in Desv.'s type) apically castaneous, as also is the carina of the frenum. Abdomen black and punctate with the incisures of the three basal segments dull

castaneous; strongly punctate with the carinae of the basal segment not reaching its apex; terebra about as long as the abdomen. Legs not very slender, fulvous with the anterior coxae and trochanters flavous; hind coxae red, their tibiae broadly white with their apices and a mark before the base black; tarsi also black with the joints basally white; calcaria concolorous, of equal length, one-third of metatarsus; fifth hind tarsal joint nearly thrice longer than the penultimate, their claws short and pectinate. Wings with the stigma testaceous, radix and tegulae flavous. Length, 8 mm.

Desvignes says this species is "somewhat allied to *G. bifoveolata* and *G. mensurator*, but differs in the legs and aculeus." Although Thomson places *G. pictipes* in very close relationship with the present species and gives no exact distinctions, he did not, as I am certainly lead to doing, consider them altogether synonymous.

It is the only species of the genus with the hind tibiae centrally clear white.

Three males, all distinct *inter se*, are placed under this species in the National Collection; one labelled "*flavipes*" by Desvignes, is identical with the type of that species, which is similarly labelled and placed in its proper position.

This species has been bred by W. H. B. Fletcher from *Spilonota ocellana* (Trans. Norf. Soc. v. p. 72); taken at Kings Lynn by Atmore and a dark variety at Earlham, near Norwich, by Bridgman (*lib. cit.* p. 631); bred at Halle in February from a microlepidopterous larva (Tasch. *l.c.*); by van Vollenhoven in April from *Teras plumbatana* (Pinac. pl. xiii); and by Fletcher of Worthing from *Eupaecilia udana* (Entom. 1884, p. 71). All the specimens I have seen were taken in August: in the New Forest by Miss Chawner; at Abinger Hammer, near Dorking by E. A. Butler; on flowers of *Angelica sylvestris* at Lackford bridge, in Suffolk; on those of *Heracleum sphondylium* at Lyndhurst, in Hants. and Felden, in Herts.; Banks bred a female from *Tortrix* larvae, found at Yarmouth, in the Isle of Wight, in June, 1905.

## 20. *sculpturata*, Grav.

*Glypta sculpturata*, Gr. I.E. iii. 7, ♂; Thoms. O.E. xiii. 1342, ♂ ♀. *G. bifoveolata*, Gr. *lib. cit.* iii. 25, excl. ♂; Holmgr. Sv. Ak. Handl. 1854, p. 97, ♀; *lib. cit.* 1860, n. 10, p. 41, ♂ ♀.

Black and shining. Head short, laterally rounded and hardly narrowed behind the eyes; cheeks buccate and epistoma hardly convex; face closely and evenly punctate, subglabrous; clypeus discreted, finely and sparsely punctate, ferrugineous; frons evenly punctate. Antennae somewhat slender apically, longer than half the body; black with annellus rufescent beneath and basal flagellar joint as long as scape. Thorax black with a flavidous callosity immediately before radix; mesonotum evenly punctate and discally subdeplanate; petiolar area of normal length, basal costa strong; metathoracic costae of the ♂ subcomplete, of ♀ wanting apically. Abdomen black and nitidulous, with the central segments subquadrate and rarely subcastaneous apically; basal segment much longer than broad, with strong carinae extending beyond the centre; terebra nearly as long as the body. Legs stout and fulvous-red; of ♂ with the coxae and bases of the trochanters always black; hind tarsi apically only slightly infuscate. Wings somewhat clouded, with the stigma



infusate, and the radix and tegulae flavous or testaceous; fenestrae entire; first recurrent nervure of lower wings antefurcal, emitting the nervellus nearly from its apex, latter of ♂ pellucid. Length, 8—10 mm.

*G. sculpturata* is very like *G. bifoveolata*, with which it was confounded by Gravenhorst, and differs only in its much larger size, buccate cheeks, posteriorly broader head and darker stigma; from *G. scalaris* it may be known by its subquadrate central abdominal segments.

Gravenhorst mentions a ♂ variety with the three basal segments red-margined and the size nearly five lines; the radix and tegulae are paler, the legs red and slightly longer than in the typical form, with the apices of their hind tibiae infusate.

On the Continent it is found on umbelliferae in August, and it has always occurred to me during that month, on flowers of *Angelica* and *Heracleum* in England. It appears to have been hitherto much overlooked or mixed among the next species with us, probably on account of the meagre original description and its involved synonymy; and there are no records, nor has it been bred. It is, however, a somewhat common species, and I possess specimens taken by Capron at Shere; Thornley at Freshney Bog in Lincs.; Sladen at Ripple, near Dover, in the middle of July; Saunders at Greenings and Copthorne Common; and Tuck at Bury St. Edmunds. It was somewhat common in Finborough Park, near Stowmarket in 1900 and Lyndhurst in 1901; and I have also taken it at Covehithe and Monks' Soham in Suffolk, and Huntingfield, near Faversham. Davies has found it at St. Issey in Cornwall.

## 21. *incisa*, Grav.

*Glypta incisa*, Gr. I.E. iii. 23; Tasch. Zeits. Ges. Nat. 1863, p. 277; Thoms. O.E. xiii. 1343, ♂ ♀.

Head with the vertex somewhat broad and only a little narrowed behind the eyes; mandibles basally punctate; clypeus and palpi generally dull ferrugineous, the former evenly and finely punctate and discreted from the prominent epistoma. Antennae black; flagellum of ♀ subattenuate towards the apex, with the basal joint rather longer than the second; of ♂ infusate or ferrugineous beneath. Thorax somewhat nitidulous with ♂ dull rufescent callosity before the radix; notauli very distinct; metathorax coarsely punctate, areae of ♂ complete; of ♀ apically obsolete with arcola subglabrous and reniform. Abdomen linear-cylindrical, as broad as the thorax and in ♂ twice longer, of ♀ slightly longer, than the head and thorax; first segment somewhat contracted basally, and the two following longer than broad and narrowly rufescent apically; terebra slightly longer than the body, with the spicula red. Legs stout and red; anterior tibiae basally flavous, hind ones with the apex and a band before the white base nigrescent, as are also the hind tarsi and apices of their femora; the fifth tarsal joint longer than the fourth, their claws obsoletely pectinate. Wings clouded with the stigma piceous, radix pale stramineous and tegulae rufescent; fenestrae entire; first recurrent of lower wing antefurcal and intercepted about one-third, or in ♂ rather less, from the bottom. Length, 9—12 mm.

The ♀ is somewhat like a large *G. mensurator*, but the ♂ differs therefrom in its longer and more linear abdomen which more closely conforms with that of *G. flavolineata* or *G. sculpturata*. The present species also resembles *G. sculpturata* in conformation, but the coxae in both sexes are

red, the colour of the tarsi and tibiae and the antennal structure are different, the central abdominal segments are more strongly punctate, with the first narrower towards its base, the cheeks are less buccate and the size is slightly larger. This is one of the largest species of the genus.

It has been bred by Atmore at Kings Lynn, in Norfolk, from *Penthina picana* (Bridgman, Trans. Norf. Soc. v, p. 72); and van Vollenhoven says (Pinac. pl. xiii) that it was "got from the resinous tumours, inhabited by *Retinia resinella*." Apparently rarer than the preceding, with which it is probably much mixed in collections, since it occurs with it in marshy situations in August. West Runton, Norfolk, in 1900 (Wainwright); Earlham, near Norwich (Bridgman); in railway carriage near Horsham in August (J. H. Morley); a male at Wicken Fen, in 1905 (Bedwell); I have taken only females, at Great Bealings, Woodbridge and Henstead marsh, in Suffolk, usually by sweeping long and rank herbage.

## 22. *annulata*, Bridg.

*Glypta annulata*, Bridg. Trans. Norf. Soc. v, p. 71, ♂ ♀.

Head with the clypeus not clothed with long and dense pubescence; frons with no horn; cheeks below the eyes not or hardly longer than the basal width of the mandibles. Thorax immaculate. Abdomen black or at most with some of the incisures red; second and third segments not distinctly transverse; terebra about as long as the abdomen. Legs with the coxae black; hind femora mainly or entirely red, their tibiae infusate at apex and before the whitish base; fifth joint of the hind tarsi, especially in ♀, decidedly longer than the fourth. Length not indicated.

This species, which is thus meagrely and not very lucidly described, appears to differ from *G. nigrina* and *G. incisa* only in its black coxae and the length of the terebra, which is longer than that of the former and shorter than that of the latter.

Four females in my collection appear to belong here; they have the mandibles very sparsely punctate, with the upper tooth slightly the longer; labrum and clypeus, except the latter's extreme base, rufescent, the latter convex and discreted, subglabrous with sparse pilosity and punctures; face finely and evenly punctate, with sparse grey pilosity and unusually prominent epistoma; vertex not very narrow. Antennae shorter than the body, filiform, not apically attenuate, with the flagellum dull ferrugineous below, the joints cylindrical and the first half as long again as the second. Thorax evenly punctate and shining; mesonotum not centrally deplanate, notauli subobsolete; metathorax more sparsely punctate with only the areolar lateral costae indicated; petiolar area not short and distinctly carinate basally. Abdomen not twice longer than thorax, with all the segments narrowly red; basal segment not longer than apically broad, with the discal carinae reaching the apex; second and third a little broader than long, with the deep oblique impressions not basally coalesced; terebra a little longer than the abdomen. Radix and tegulae flavous, stigma testaceous; first recurrent antefurcal and intercepted a fourth from the bottom. Length, 7 mm.

Females of this species are said (*lib. cit.* 68) to have been bred from some unascertained host by Mr. Fletcher, probably at Worthing. My females were captured by Piffard at Felden, in Herts.; Tuck at Tostock, in Suffolk, in the middle of July; and by myself on flowers of *Angelica sylvestris* in Barnby Broad, near Lowestoft, in the middle of July and the middle of August.

23. *nigrina*, Desv.

*G. nigrina*, Desv. Cat. 74, ♀; cf. Bridg. Trans. Norf. Soc. v. p. 71, ♂ ♀. *Glypta flavipes*, Desv. Cat. 75, ♂; Bridg. E. M. M. 1890, p. 208, ♀.

Head with the clypeus, mandibles and palpi pale; face and clypeus with long and dense silvery pubescence; frons mutic; epistoma not prominent nor clypeus discreted; cheeks as long as width of mandibles at base. Antennae as long as the body; scape infusate, of ♂ flavous beneath; flagellum fulvous or rufescent, pale testaceous beneath. Thorax black with a stramineous callosity before the radix, notauli wanting; metathorax distinctly and not very closely punctate with all the areae distinct, areola elongate and emitting distinct costulae from its centre; petiolar area very short and distinctly carinate basally; pleurae punctate and nitidulous. Abdomen shining with the oblique impressions deep; second and third segments subquadrate and apically obscurely rufescent; the fifth and following nitidulous; carinae of the basal segment nearly reaching its apex, which is obtusely angled; terebra a little shorter than the abdomen. Legs fulvous, hind ones red; anterior coxae and trochanters of ♂ flavous; bases of the apically infusate hind tibiae and tarsal joints white; fifth hind tarsal joint not longer than the fourth. Wings with the stigma testaceous, radix and tegulae pale. Length, 8—9 mm.

[The following description of *G. nigrina*, drawn from Desvignes' Catalogue and amplified by an examination of the co-types in the British Museum, leaves very little doubt respecting the above synonymy:—

Head constricted behind the eyes, black with the mouth ferrugineous and the palpi fulvous; clypeus with only short pubescence, not discreted but on the same plane as the face which has the epistoma prominent. Antennae somewhat longer than half the body, ferrugineous above flavescent with the scape sometimes apically flavous beneath. Thorax black with an often elongate flavescent callosity before the radix; metathorax convex with all the areae very plainly delineated; areola elongate, hexagonal, emitting distinct costulae from its centre; petiolar area distinctly costate basally and centrally, short and subvertical. Abdomen black, somewhat nitidulous and as broad as the metathorax; basal segment a little longer than broad, with the carinae extending but little beyond its centre; the following segments subquadrate; terebra slightly shorter than the abdomen. Legs pale red; front, and sometimes the intermediate coxae, flavescent; hind femora infusate at base and apex, their tibiae dark, basally whitish; tarsi infusate. Wings with the stigma piceous or dull stramineous, radix and tegulae flavous; nervellus intercepted slightly below the centre. Length, 8 mm.]

Desvignes described this species from three males (and another misplaced), from Stephens' collection, in the British Museum. Bridgman says (Trans. Norf. Soc. v. p. 72) that Atmore bred both sexes from *Anthesia capraeana* and *Pachisca solandriana* at Kings Lynn in 1889. It is probably widely distributed, though not very common in Britain. I possess three males: one taken by Piffard at Felden, in Herts. on 24th June, 1900; one bred from an unascertained host by Clutton, at Burnley on 8th August of the same year; and one taken on a window of Monks' Soham

House, on 5th August, 1905. The female was described from six specimens, from Desvignes' and Heysham's collections, still extant in the British Museum; I possess three others captured by Miss Chawner in the New Forest, Piffard at Felden and Beaumont, late in June at Oxshott in Surrey.

## 24. *parvicaudata*, Bridg.

*Glypta parvicaudata*, Bridg. Trans. Ent. Soc. 1889, p. 435, ♂ ♀.

A dull and punctate species, with the abdomen entirely black. Head constricted behind the eyes; face shining, evenly punctate and centrally carinate; palpi pale; the often testaceous clypeus with no dense pubescence, and the frons mutic. Antennae about two-thirds the length of body. Thorax immaculate; metathorax usually with five areae. Scutellum black. Abdomen with the basal segment extending beyond the hind coxae, with the carinae hardly reaching beyond its centre; the second and third segments transverse, more especially in the ♀, with the oblique impressions somewhat deep; terebra about three-quarters the length of the abdomen. Legs red with the apices of the hind femora infusate; apices of the hind tibiae, and of their tarsal joints, dark piceous, with the indication of a concolorous band before the somewhat pale base of the former; hind claws distinctly pectinate. Wings with the tegulae ferrugineous, stigma pale piceous and the nervures dark; transverse anal nerve intercepted below the centre and rather less than one-third from the bottom. Length, about 8 mm.

Bridgman says that this species differs from *G. resinanae* in having the scape black, tegulae red, the terebra and the central segments shorter and the anal transverse nerve intercepted at a lower point.

A single pair were bred by Mr. Fletcher out of "*Hysipetes*" *ruberata* from Stornoway at the end of May (Trans. Ent. Soc. *l.c.*) and he subsequently also bred it from *Peronea mixtana* (Trans. Norf. Soc. v. p. 72). Buckler adds that Chapman has also raised it from *Ypsipetes ruberaria*. I have seen a female captured by A. Roman at Upsala, in Sweden.

## 25. *lugubrina*, Holmgr.

*Ichneumon mensurator*, Fab. S. E. 338; *Pimpla mensurator*, Fab. Piez. 116(?). *Glypta mensurator*, Gr. I. E. iii. 21; Tasch. Zeits. Ges. Nat. 1863, p. 277 (part.); Thoms. O. E. xiii. 1349, ♂ ♀. *G. lugubrina*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 41, ♂ ♀. Var. *G. bifoveolata*, var. 2, Gr. I. E. iii. 26, ♀.

A somewhat curved insect with the abdomen centrally red. Head circularly constricted behind the eyes; face strongly tuberculate; palpi rarely pale, labrum sometimes obscurely and clypeus always ferrugineous, latter not strongly convex and subglabrous with very sparse black pilosity. Antennae filiform; of ♂ nearly the length of the body, black with the flagellum generally ferrugineous beneath; of ♀ rather longer than half the body, black and rarely entirely red beneath. Thorax evenly and somewhat closely punctate, black, generally with a white radical callosity; metathorax short and convex with the areola entire and apically explanate,

emitting obsolete costulae from its centre; petiolar area elongate, with its basal costa in ♀ hardly and in ♂ distinctly elevated. Abdomen cylindrical or subfusiform, as broad as the thorax and rather longer than it and the head; the three basal segments castaneous and margined with, or the second sometimes nearly entirely, red; the fourth and fifth often apically rufescent; first segment only a little longer than apically broad, basally dilated and laterally sinuate before the subprominent spiracles, with somewhat elongate carinae; terebra as long as the body. Legs not very slender, red or fulvous; front coxae very rarely, anterior trochanters rarely and the hind ones with their coxae generally, basally black; front trochanters generally and the intermediate sometimes pale flavous beneath; hind tibiae testaceous with the apices, a band before the whitish base and the extreme apices of femora infusate, their pectinate tarsi also infusate but with the base of the joints pale. Wings somewhat clouded; stigma broad and stramineous, or in ♂ subpiceous; tegulae testaceous; discoidal cell with its lower angle subacute. Length, 7—8½ mm.

It may be known by its broad and partly red abdomen, transverse segments and elongate terebra; it is always larger and proportionately shorter than *G. bifoveolata*.

Gravenhorst mentions a variety with the four basal segments red with only the disc of the third and fourth infusate. Chitty took a ♀ of 9 mm. at Huntingfield, near Faversham, in August, 1902, which had only the anus infusate. The var. *bifoveolata* differs in having the flagellum entirely red. *G. lugubrina* appears to be distinguished from the largest example of *G. mensurator* described by Gravenhorst in nothing but the often inconstant coxal coloration; the former is said to have the coxae and base of trochanters nigrescent, the antennae not apically attenuate, the metanotal areae subcomplete, the second and third segments transverse and the terebra about as long as the body. But, since Gravenhorst certainly described more than one species under his *G. mensurator*, Holmgren's name must be adopted. Thomson (*l.c.*) considers them synonymous, but Bridgman (Trans. Norf. Soc. v, p. 69) is by no means persuaded that this is the case. *Glypta lugubrina* (*sic*) is poorly figured in "Knowledge," v, p. 245.

It is said to occur on the Continent upon *Umbelliferae*; and both sexes have been bred, according to Bridgman (*l.c.*), from *Eupacilia hybridellana* by Fletcher and Barrett and from a species of *Catoptria* by W. H. B. Fletcher, of Worthing; Van Vollenhaven says *G. mensurator* was "got from the resinous tumours inhabited by *Relinia resinella*." It is abroad rather earlier than most species of this genus, and I have records from the end of June to 29th August; to me it has always occurred singly at long intervals; but Piffard at Felden, Capron at Shere, and Bloomfield at Guestling in 1879, all used to find it commonly. Thornley has taken it at Tresswell Wood in Notts in July, Peacock at Cadney in Lincs, Bridgman at Horning Ferry in the Norfolk Broads, Donisthorpe at Deal, Sladen at Ripple near Dover, Routledge at Tarn Lodge, near Carlisle, Evans at Longinddry in August and St. Davids in Fife in June, Butler at Hastings, Richardson at Corfe Castle in August, Gordon on Hemlock in Wigtonshire in July and Davies at St. Issey and Padstow in Cornwall. In Suffolk it has only occurred to me in Barnby Broad on the flowers of *Angelica sylvestris*, both sexes at Monks' Soham and at Kessingland cliffs on those

of *Heracleum sphondylium*. Marquand records it from the Lands End district; and Marshall says (Entom. 1872-3, p. 432) that Francis Walker found *G. mensurator* in the Isle of Man.

An unexplained instance of this species' oviposition upon plants (*cf.* Ichn. Brit. i. xxiii) is given in Ent. Rec. 1900, p. 293, by Mr. P. C. Reid, who, writing from Feering Bury, near Kelvedon, on July 30th, says "I was yesterday searching lettuce heads for larvae of *Hecatera dysodea*, and, noticing numbers of the enclosed ichneumon on the wing, I watched them for nearly an hour. I never saw one in the act of stinging a larva, although there were several lying fully exposed, but I noticed many of them ovipositing in the flowers and seed-vessels of the lettuce plants themselves. . . . Though I opened several of the flowers and examined them under a glass, I could find no lepidopterous egg or larva of any sort." No single instance has ever before been brought forward of phytophagous larvae among the Ichneumonidae, and those of Braconidae mentioned by Westwood (Mod. Class. ii. 144) were purely supposititious. I am consequently still lead, as I stated at the time, to consider that some error crept into Mr. Reid's statement, in spite of the very close observation he shows: the main point appears to be that no egg of the *Glyptae* is mentioned and probably therefore he mistook mere abdominal contortions for the act of oviposition.\*

## 26. *rufata*, Bridg.

*Glypta rufata*, Bridg. Trans. Ent. Soc. 1887, p. 378, ♂ ♀; *cf.* Trans. Norf. Soc. v, p. 71.

A shining, punctate, black species with the abdomen and legs mainly red. Head transverse and constricted behind the eyes; palpi and the apex of the clypeus piceous, the latter with no dense pubescence; frons mutic. Antennae three-quarters the length of the body, with the flagellum rufescent beneath. Thorax immaculate with the notauli not very distinct anteriorly; mesopleurae shining and punctate, much more sparsely apically; metanotum nitidulous, transversely rugose, with five more or less distinct areae. Scutellum black. Abdomen red with the anus more or less, and usually the segments faintly transversely, infusate; basal segment a little longer than broad with the carinae basally distinct and apically obsolete; second and third segments one-fourth broader than long; terebra hardly shorter than the abdomen. Legs red with the apices of the tibiae and of the tarsal joints, as well as a band before the base of the former, slightly infusate; tarsal claws pectinate. Wings basally flavescent with the tegulae red, stigma of ♀ pale and of ♂ infusate; transverse anal nervure intercepted below the centre and one-third from the bottom. Length, 5—6 mm.

Bridgman says that this very distinctly coloured species somewhat resembles *G. monocerus*, but that the frons bears no horn, the legs are differently coloured and their claws are distinctly pectinate. Thomson, in a note (O. E. 1352), adds that he has seen the type and considers it most closely allied with *G. mensurator*.

\* *Glypta subcornuta*, Grav. (I.E. iii. 15, ♂ ♀), is recorded as British in Curtis' Guide, but figures in none of our later catalogues, nor has anyone recognised it on the Continent. It is said to be similar in size and shape to *G. mensurator*, Grav., but with the terebra longer and frons acuminate. Both Bridgman (Trans. Norf. Soc. v, p. 67) and Schmiedeknecht (Opusc. Ichn. 1223) are satisfied to suppose it a form of that species. Thomson (O. E. xiii. 1337) also shortly refers to it.

Both sexes were originally bred by Mr. W. H. B. Fletcher from *Eupatilia notulana* from Wicken Fen, in June, 1886; and are probably in Bridgman's collection at Norwich. I possess a single pair, which was given by Bridgman to Dr. Capron.

### 27. *scalaris*, Grav.

*Glypta scalaris*, Gr. I.E. iii. 24; Zett. I. L. 376, ♀; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 42; Thoms. O.E. xiii. 1345, ♂ ♀.

A somewhat shining, alutaceously punctate and black species. Head with the mouth infusate, clypeus often apically rufescent but with no dense pubescence; frons not cornuted, but epistoma with a prominent tubercle. Antennae entirely black, not very long nor slender. Thorax somewhat convex, with a pale callosity before the radix; metathorax with five subcomplete upper areae; the petiolar area elongate and basally angular; areola basally parallel-sided and not extending beyond the obsolete costulae. Scutellum black. Abdomen hardly parallel-sided, of ♀ somewhat nitidulous, of ♂ dull and constricted towards the anus, with the three basal incisures very narrowly rufo-ferrugineous; the second and third segments decidedly transverse; terebra nearly as long as the abdomen. Legs somewhat stout, fulvous with the hind tarsi except at their apices and the apices of their tibiae nigrescent; ♀ with base of coxae, ♂ with whole of the coxae and base of the trochanters black. Wings normal, subhyaline with the stigma dull stramineous; radix and tegulae pale stramineous, the latter sometimes becoming fulvous. Length, 5—6½ mm.

A variety of this species is intermediate between *G. scalaris* and *G. teres*, but with the body larger and stouter than either: the head has the mandibles centrally flavous; antennae ferrugineous and darker above with the scape black; thorax with a flavous callosity before the radix; tegulae fulvous, radix and stigma stramineous; legs red with most of the coxae, the hind tarsi and apices of their tibiae black; terebra as long as the abdomen with the spicula red.

In outline this species is similar to the ♀ of *G. mensurator* differing, according to Gravenhorst, in the shorter terebra. Holmgren says it resembles *G. lugubrina*, except in the colour of the hind legs and terebral length.

Brischke records *Nephoteryx vaccinella* as the host of *G. scalaris*, Holmgr., which he considered distinct from that of Gravenhorst. I possess four females, taken by Capron at Shere, in Surrey, which agree with the above description of authors; they are, however, distinctly smaller than *G. bifoveolata*. Piffard has also found it at Felden in Herts.

28. *bifoveolata*, Grav.

*Glypta bifoveolata*, Gr. I.E. iii. 25, excl. ♀. et varr. ♀; Tasch. Zeits. Ges. Nat. 1863, p. 277; Thoms. O.E. xiii. 1342, ♂ ♀; Voll. Pinac. pl. xiii, f. 6. (*nec* Holmgr.). Var. *G. teres*, var. 1, Gr. I.E. iii. 8, ♂.

A small, linear, black and shining species. Head somewhat short and circularly contracted behind the eyes; face centrally tuberculate; mouth infusate with clypeus often apically rufescent; frons subconvex and closely punctate; cheeks not buccate and clypeus discreted; mandibles at the base dorsally convex with the external margin not reflexed; labrum of ♂ stramineous or dull ferrugineous. Antennae half the length of the body or a little longer; ferrugineous beneath, with the scape black; ♀ flagellum filiform with the basal joint half as long again as the second, which is about as long as the third; of ♂ apically attenuate with the scape sometimes substramineous beneath. Thorax immaculate; pleurae not alutaceous but strongly and not very closely punctate; metathorax with often complete upper areae, the basal area and oblique costulae being especially distinct. Abdomen sublinear, strongly punctate and nitidulous with the anus smooth; the three basal incisures subcastaneous; first segment basally produced, slightly curved, marginate above and depressed on either side before the rounded apical angles, with carinae extending beyond the centre; the second and third subtransverse and punctate, following nitidulous; terebra half as long again as the body. Legs normal, pale red with the hind coxae sometimes partly, and their tarsi towards the apex, infusate with the fifth joint longer than the fourth. Wings subhyaline; radix, tegulae and stigma stramineous, the last being occasionally piceous. Length, 4—6 mm.

The ♂ sometimes has the abdomen entirely black; and the var. *teres* has the posterior coxae and trochanters centrally infusate and the hind tarsi, with the apices of their tibiae, nigrescent. Holmgren's species is now considered distinct from that of Gravenhorst.

Bridgman (Trans. Norf. Soc. v, p. 68) says *G. bifoveolata* is very closely allied with *G. sculpturata*, from which it mainly differs in the more strongly contracted base of the head and the paler stigma; the disparity of size will immediately separate them.

It occurs on the Continent in August; and is recorded by Hope from Netley in Shropshire, and as common at Earlham near Norwich by Bridgman, who tells us (*loc.*) that Fletcher has bred it from an unascertained host, probably at Worthing. It has also been bred by Elisha from *Ephippiphora foeneana* and by Weston from *Dicrorampha simpliciana* (Fitch, Entom. 1880, p. 68 et 1883, p. 67). Maquand records it from the Lands End district, and Bignell from Bickleigh in Devon, late in August; Hamm has sent me specimens from Ogley Bog, near Oxford, in July and Bovey Tracy, in south Devon, in August; Butler from Wymondley in Herts; and Gordon from Wigtonshire, in June. I possess specimens taken by Marshall at Botusfleming, in Cornwall; Bridgman at Earlham, as noticed above (*cf.* also Trans. Norf. Soc. v, p. 66); Capron at Shere and W. Saunders at Greenings, in Surrey; Piffard at Felden, in Herts; Butler at Hastings; and Tuck at Bungay, Aldeburgh, Bury St. Edmunds and Tosstock, in Suffolk. This is by far the most abundant species of the genus and occurs freely on the flowers of *Spiraea ulmaria*, *Angelica sylvestris*,



*Dauca carota* and *Heracleum sphondylium*, the males from July 6th to September 10th and the females from the 24th of July to about ten days longer than the males in the autumn; I have heard of no captures in Britain outside England, throughout which, however, it is certainly widely distributed. I have taken it at Lyndhurst and Lymington, in Hants; about Faversham, in Kent; at Gosfield, in Essex; and in Suffolk at Peasenhall, Claydon bridge, Farnham, Sibton Abbey, Bentley Woods, Covehithe, Blythborough, Finboro' Park, Lackford bridge, Brandon, Barton Mills, Burgh Castle, Southwold, Aldeburgh, Bramford, Henstead marsh and by the Gipping at Blakenham.

### 29. *flavolineata*, Grav.

*Glypta flavolineata*, Gr. I.E. iii. 27; Zett. I.L. 367; Ratz. Ichn. d. Forst. i. 121; Holmgr. Sv. Ak. Handl. 1854, p. 95; *lib. cit.* 1860, n. 10, p. 39; Tasch. Zeits. Ges. Nat. 1863, p. 277; Thoms. O.E. xiii. 1332, ♂ ♀; Voll. Pinac. pl. xiii, f. 3.

Hardly shining, very closely punctate and pubescent. Head short, transverse and contracted behind the eyes; cheeks somewhat dilated and posteriorly more or less sinuate; frons mutic, closely and somewhat deeply punctate; mouth flavous and mandibles apically black; clypeus distinctly convex and very finely punctulate, apically rounded and laterally produced; labrum exserted, short and semicircular; mandibular teeth acute and of equal length. Antennae slender, filiform, infusate and shorter than the body; ferrugineous, with the scape generally flavescent, beneath; scape straight and subcylindrical with the apex concave and hardly oblique; apical joint small, conical and obtuse. Thorax with an elongate callosity before, and a dot beneath, the radix flavous; mesonotum closely and strongly punctate; metathorax with five complete upper areae, areola longer than broad and emitting the costulae before the centre. Scutellum entirely, or at the apex and generally the sides, flavous; generally also with the postscutellum transversely concolorous. Abdomen strongly and closely punctate, with white pilosity; of ♀ nearly thrice longer and a little narrower than the thorax, of ♂ cylindrical and slightly longer and narrower than the ♀; three basal segments sometimes apically subcastaneous, the first elongately bicarinate, longer than broad and the two following subquadrate with the oblique impressions nearly confluent basally; terebra nearly as long as the abdomen, black with the spicula castaneous. Legs somewhat slender, fulvous with the front and sometimes the intermediate coxae and trochanters flavescent beneath; hind femora above generally black at the base and apex, their tibiae infusate with the base always whitish, rarely either ferrugineous with the apex infusate or dull flavidous with the apex and an obsolete band before the base infusate; hind tarsi nigrescent with the calcaria half the length of the metatarsus, their claws not elongate nor strongly though distinctly pectinate. Wings normal and hardly clouded with the stigma stramineous or fulvescent, radix and tegulae flavous; radial cell lanceolate; nervellus almost postfurcal, fenestrae discreted. Length, 8—10 mm.

Holmgren mentions three varieties: both sexes with the thorax, except scutellum, entirely black; both sexes with the hind tibiae, except their infusate apices, fulvous or rufescent; and the female with its abdomen above partly dull red.

It occurs on the Continent in May and August and is not unfrequent in Sweden, etc. Porritt has bred it from *Phycis Betulella* (Trans. Norf. Soc. v, p. 72); Goureau (Dours' Cat. 66) from *Aspidia cynosbata*; and two males were bred from the larvae of *Odonestis potatoria* by R. Adkin (Proc. S. Lond. Soc. 1896, p. 82). There are records of this species from Eaton and Brundall, in Norfolk (Bridgman); Bickleigh, in Devon, in late August (Bignell); several of both sexes at Lynton, in the same county, in 1890 (S. Edwards); and I possess other examples from Brockenhurst in August (Donisthorpe); Felden in Herts (Piffard); Guestling, near Hastings, in 1889 (Bloomfield); Chickerell, near Weymouth, early in the August of the same year (N. M. Richardson); Treswell, in Nottinghamshire, early in September (Thornley); and Shere in Surrey (Capron). It is probably a somewhat local species, and is certainly rare in Suffolk, occurring from the beginning of August to the middle of September only; I once took a female on a flower of *Angelica* in the Bentley Woods, and early in September 1899, a great many of both sexes were one morning common on the numerous plants of *Foeniculum vulgare* at Alderton on the Suffolk coast, about a mile from the sea.

### 30. *cicatricosa*, Ratz.

*Glypta cicatricosa*, Ratz. Ichn. d. Forst. ii. 103; Thoms. O.E. xiii. 1333, ♀.

Head with the clypeus and mandibular marks flavous; frons mutic. Antennae pale beneath; thorax with an elongate flavous callosity before the radix. Scutellum apically flavous; abdomen with the central segments transverse and their oblique impressions not nearly confluent basally. Legs fulvous, the hind ones black-marked with their tibiae internally rufescent. Length, 8 mm.

As Bridgman says (E.M.M. 1890, p. 208) "Ratzeburg's description of this, and his other new species of *Glypta*, having the scutellum and thorax marked with yellow, are not so clear as they might have been"; but the present differs from *G. flavolineata* so little as to need no detailed description above. The central segments are, as Thomson points out, a little shorter, more strongly rugose-punctate and nearly dull, with the impressions distinctly less closely converging basally. The shape of these segments will also distinguish it from *G. evanescens*. I have further noticed that it appears to constantly have the mesonotum longitudinally subcanaliculate and the second and apex of the first segment, especially in the ♂, strongly carinate longitudinally in the centre.

A fine female was sent to Bridgman to name by the Rev. E. N. Bloomfield, who took it in the vicinity of Guestling, in Sussex; it is now in the former's collection in the Norwich Castle Museum. Curiously enough on 18th August, 1902, I received both sexes of this species from both Mr. F. C. Adams from Lyndhurst and Mr. J. W. Cross from Brockenhurst, in the New Forest: these are the only specimens I have seen. Ratzeburg (*l.c.*), quoted by Kirchner, says that Reissig bred this species from *Tortrix viridana*, on 20th June, 1846, at Darmstadt.

31. *evanescens*, Ratz.

*Glypta evanescens*, Ratz. Ichn. d. Forst. ii. 103; Thoms. O.E. xiii. 1333, ♂ ♀; cf. Bridg. Trans. Ent. Soc. 1889, p. 436 et E.M.M. 1890, p. 208.

Head somewhat strongly constricted behind the eyes, with long and sparse grey pilosity; epistoma not at all prominent; clypeus and whole mouth of ♂ stramineous, of ♀ rufescent, the former almost longer than apically broad, with large and shallow punctures; frons mutic, transversely impressed above the scrobes, deeply and evenly punctate with the interstices smooth; palpi pale. Antennae about as long as the body, filiform and slender; ♀ flagellum testaceous apically below, ♂ with the scape stramineous and the flagellum testaceous throughout beneath. Thorax black with a flavous callosity before the radix; mesonotum shining, finely and not very closely punctate, with distinct notauli; metanotum strongly elongate, pilose and exareated; petiolar area extremely short with distinct basal carina. Scutellum laterally and apically, with the frenum narrowly, flavous. Abdomen linear-cylindrical and narrower than the thorax, black and nearly smooth with grey pilosity; basal segment twice longer than apically broad, hardly sinuate behind the spiracles, with the obsolete discal carinae quite (♀) or nearly (♂) reaching the apex; central segments very distinctly longer than broad, with the oblique impressions basally confluent; terebra as long as the six basal segments. Legs fulvous; the anterior flavous with the coxae and all the trochanters stramineous; hind pair with tarsi, apices of tibiae and ♀ calcaria infuscate. Wings hyaline; stigma dull testaceous, radix and tegulae stramineous; fenestrae discreted; first recurrent antefurcal and intercepted, especially in ♀, far below the centre. Length, 9–10 mm.

Bridgman truly says that this species may be known from both *G. flavolineata* and *G. cicatricosa* by the central segments being longer than broad; and adds that they are at least half as long again as broad, lending the insect the elongate facies of *Ephialtes*.

I possess four specimens, including one female, taken by Dr. Capron about Shere, in Surrey, as mentioned (*l.c.*) by Bridgman, when introducing the species as British. Mr. Stanley Edwards took another female at Lynton in 1890. It was originally bred by Ratzeburg from *Haliastur quer-cana* in Prussia, as indicated by Kirchner.

32. *lineata*, Desv.

*Glypta lineata*, Desv. Cat. 76, ♀; Thoms. O.E. xiii. 1352, ♀; Bridg. Trans. Norf. Soc. v, 70, ♂ ♀.

Somewhat curved, dull and clothed with grey pubescence. Head constricted behind the eyes, black with the face obscurely red and furnished with short white hairs; mandibles castaneous, cheeks normal; clypeus red and apically densely pubescent; frons mutic, evenly punctate and somewhat shining. Antennae subfiliform, ferruginous above and fulvous beneath. Thorax red with the sternum darker; mesonotum of the ♂ black, of ♀ with three broad discal black vittae; metathorax short and

strongly convex, costae of ♀ wanting; petiolar area subvertical and basally finely costate. Scutellum red. Abdomen red, of ♂ with the anus infusate, of ♀ dull, densely punctate and pubescent, as broad as the thorax with the bases of the segments infusate; basal segment short, laterally narrowed towards the base, spiracles not prominent; the second to the fourth transverse; terebra black and nearly as long as the abdomen. Legs red or fulvous; hind tibiae and the tarsal joints, basally whitish, latter as well as the tibiae at apex and before the base infusate. Wings with the radix and stigma flavous. Length, ♂  $5\frac{1}{2}$  mm., ♀ 6 mm.

This species, which appears to be confined to Britain as far as is at present known, was described from one male and two females which I have examined from Mr. Desvignes' collection, now in the National Museum. Females have been bred from unascertained lepidopterous hosts by Fletcher (Trans. Norf. Soc. v, p. 68).

### 33. *ruficeps*, Desv.

*Glypta ruficeps*, Desv. Cat. 76, ♀; cf. Bridg. Trans. Norf. Soc. v, 69.

Castaneous throughout. Head with the frons mutic and mandibles flavous; face clothed with somewhat long silvery pubescence, epistoma not prominent. Antennae longer than half the body, red above and flavous beneath. Thorax castaneous throughout, with a white callosity before the radix; metathorax punctate, pilose and somewhat shining with the areae incomplete; areola at base and the costulae prominent; mesopleurae convex, sternauli wanting. Scutellum convex and castaneous. Abdomen castaneous with the extreme apices of the segments black; basal segment broad with the carinae obsolete; terebra as long as the abdomen. Legs testaceous; hind tarsi except their apical joint and their tibiae infusate, latter basally white. Wings with the stigma dull stramineous, radix flavous. Length, 8 mm.

In superficial facies it is somewhat similar to *Pimpla pomorum*, Ratz.

The apparently unique female of this very distinct species, from Desvignes' collection, is in the British Museum. From an examination of it I have been enabled to add a few structural details to the colour-features originally indicated, to correct the length of the terebra, colour of the head and to obtain the exact length of the body.

*Tribe*

LISSONOTIDES.

No hesitation can be experienced respecting the representatives of this Tribe, for they are all easily distinguished by negative characters: the head is transverse and not cubical, as in the *Xoridides*; the abdomen is evenly sculptured throughout and not impressed nor tuberculate, as in the *Pimplides*; the hypopygium does not reach the anus nor cover the base of the terebra, although in *Procinetus* and *Lampronota* it has distinct indications of such a modification and they are certainly closely related to *Acaenitides*; and the areolet is triangular or oblique and small or wanting, never rhomboidal, as in the *Banchides*.

Many of the species of this group are among our commonest British insects and most beneficial parasites; the nomenclature has undergone considerable alterations and emendations since the publication of the last British list; but it is still almost certain that but a fraction of the indigenous genera and species is at present known.

*Table of Genera.*

- |       |     |  |                             |
|-------|-----|--|-----------------------------|
| (12). | 1.  | Metathoracic spiracles circular, small and, if somewhat oval, oblique. |                             |
| (9).  | 2.  | Tarsal claws not pectinate, at most setiferous.                        |                             |
| (6).  | 3.  | Body elongately pilose or metanotal areae complete.                    |                             |
| (5).  | 4.  | Finely pubescent; face apically acuminate; stigma broad                | STILBOPS, <i>Först.</i>     |
| (4).  | 5.  | Elongately pilose; face and stigma normal                              | ARENETRA, <i>Holmgr.</i>    |
| (3).  | 6.  | Body not elongately pilose nor metathoracic areae complete.            |                             |
| (8).  | 7.  | Apical flagellar joints moniliform and discreted; terebra short        | CRYPTOPIMPLA, <i>Tasch.</i> |
| (7).  | 8.  | All flagellar joints cylindrical and not discreted; terebra elongate   | LISSONOTA, <i>Grav.</i>     |
| (2).  | 9.  | Tarsal claws distinctly and usually closely pectinate.                 |                             |
| (11). | 10. | Abdomen subsessile and usually dull; areolet triangular                | MENISCUS, <i>Schiöd.</i>    |
| (10). | 11. | Abdomen subpetiolate, strongly shining; areolet oblique                | PHYTODIAETUS, <i>Grav.</i>  |
| (1).  | 12. | Metathoracic spiracles elongate, large or transverse.                  |                             |
| (16). | 13. | Notauli obsolete; areola wanting; areolet entire.                      |                             |
| (15). | 14. | Nervellus intercepting below centre; nervelet obsolete                 | SYZEUCTUS, <i>Först.</i>    |
| (14). | 15. | Nervellus intercepting far above centre; nervelet elongate             | PROCINETUS, <i>Först.</i>   |
| (13). | 16. | Notauli very deep; areola laterally entire; areolet wanting            | LAMPRONOTA, <i>Hal.</i>     |

## STILBOPS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 163 ; Thoms. O. E. xiii. 1427.

Head somewhat pointed, tapering from the broad eyes, through the constricted cheeks, to the narrow and prominent mandibles and exerted ligula ; face with dense and elongate silvery pubescence, a little elevated longitudinally in the centre and not laterally emarginate ; clypeus not centrally discreted but with an oblique fovea on either side, apically rounded, glabrous, somewhat reflexed but obsoletely margined, teeth of equal length with the lower more acuminate ; frons subconvex, distinctly impressed transversely throughout above the antennae and not longitudinally canaliculate in the centre ; vertex narrow and angularly emarginate in the centre. Antennae of ♀ slightly incrassate towards their apices with the apical joint obtuse and nearly as long as the three following together, of ♂ filiform with the apical joint not longer than the penultimate. Thoracic epomiae reaching shoulders, notauli wanting, frenum dentately produced above the posterior radices ; metanotum not short, gradually declived throughout, with the areae distinct and spiracles circular. Abdomen finely and closely punctate and pilose, convex and subcylindrical, with no trace of tubercles nor impressions, though with the three basal segments apically subelevated ; basal segment nearly half as long again as the second, convex and not impressed, with no carinae and only basally subexcavate, narrowly margined at the sides and broadly sessile, with the spiracles before the centre ; terebra shorter than basal segment, stout, obsoletely pilose, deflexed and apically obtuse. Legs slender ; tarsal claws minute, not pectinate, curved and not basally lobate ; first joint of front tarsi strongly emarginate basally, with calcaria curved ; onyches not explanate. Stigma broad, subtriangular ; areolet entire, sessile, irregularly oblique ; nervellus opposite and intercepting only slightly above the posterior nervure.

Thomson, who gave the first at all detailed account of this genus, points out that the hypopygium is not retracted as in *Pimpla*, but takes the same form as in *Lissonota* and *Glypta*, as also do the onychii, which are not stout and explanate, as in *Pimpla*. From all the allied genera, *Stilbops* differs in the shortly subrostrate mouth, the close and silvery facial pubescence, distinctly and completely costate metathorax, large stigma and oblique nervellus, and in the uniformly punctate abdomen, bearing no tubercles nor impressed lines.

It is usually placed in the *Lissonotini*, but Schmiedeknecht regards it as little more than a subgenus of *Pimpla* ; indeed, it unites many features of both sections and forms a more or less natural connecting link. Gravenhorst described our single species under three distinct genera.

# 1. *chrysostoma*, Grav.

*Phytodietus chrysostomus*, Gr. I. E. ii. 940, ♀; Dalla Torre, Wien. Ent. Zeits. 1890, p. 139, ♂ ♀. *Pimpla vetula*, Gr. I. E. iii. 201; Tasch. Zeits. Ges. Nat. 1863, pp. 63 et 270, ♂. *P. varicauda*, Capron, E. M. M. 1888, p. 218, ♀. *Stilbops vetula*, Thoms. O. E. xiii. 1428; Schm. Zool. Jahrb. 1888, p. 530, ♂ ♀. *Lissonota pallipes*, Gr. I. E. iii. 55, ♂; cf. Tasch. Zeits. Ges. Nat. 1863, p. 290 et Schm. Opusc. Ichn. 1328.

A smooth black species with slender legs, broad piceous stigma and red apices to ♀ antennae and abdomen. Head as broad as thorax and strongly narrowed behind the eyes; palpi and a mandibular mark flavescent; cheeks strongly constricted, with genal costa inflexed; face of ♂ with long griseous, of ♀ with silvery, dense pilosity; clypeus depressed, smooth, deeply foveate and not transverse. Antennae infusate and somewhat explanate towards their apices, of ♀ a little longer than half the the body and pale red beneath, of ♂ nearly as long as the body and stramineous beneath; basal flagellar joint cylindrical and longer than the second; ♀ with the oblong-ovate apical joint, and the penultimate, entirely testaceous. Thorax black, shining and sparsely pubescent; mesosternum not transverse and somewhat finely punctate; metathoracic areae complete, though in ♂ sometimes obsolete; areola small and emitting the costulae before its centre; spiracles small and circular. Scutellum black. Abdomen sessile and not uneven, as long as the head and thorax and a little narrower than the latter, with the densely punctate segments apically margined with testaceous or castaneous; basal segment elongate, slightly curved, not canaliculate and gradually a little dilated towards the apex, basally glabrous and foveate with the postpetiole obsoletely margined and the spiracles before the centre; second with distinct thyridii, of ♀ quadrate, of ♂ longer than broad; ♀ with second to fourth parallel-sided and laterally more or less, with the anus entirely, red; fifth segment with the venter sometimes acutely prominent; plica stramineous; terebra one fifth the length of the abdomen. Legs fulvous; coxae black with the anterior, of ♂ at least, apically whitish; anterior trochanters of ♂ whitish with the hind ones red and basally black, of ♀ black with their apices flavous; hind femora basally more or less broadly black, their tibiae infusate with the basal half sometimes obsoletely rufescent; hind tarsi and all the claws infusate; calcaria of equal length and one-third the length of the metatarsus. Wings hyaline with the peculiarly broad stigma and the radius piceo-ferrugineous; radix and tegulae whitish; areolet irregular, oblique and subsessile; lower angle of the discoidal cell acute; radius basally curved and a third of the apical length; nervellus intercepting far below the centre. Length,  $4\frac{3}{4}$ — $6\frac{1}{2}$  mm.

This species is said by Gravenhorst to be somewhat allied to *Pimpla (Aphanoroptum) abdominalis*; he places it next to *P. scanica*, to which its

basally attenuate antennae superficially ally it. Thomson, whose excellent description Schmiedeknecht appears to have entirely overlooked, considers the abdominal puncturation to resemble that of the *Tryphoninae*; and the latter remarks that the stigma is sometimes red-yellow, though I find it always uniform castaneous, with the margins a little darker, in Britain. As to the synonymy, no doubt can be entertained that *P. chrysostomus* has priority; and the two co-types of Dr. Capron's species, which are now in my collection, are typical ♀♀ of the present insect. This species is remarkably constant in colouration. There can remain no doubt respecting the synonymy herewith of *L. pallidipes*, Grav.; the wonder is that they have not hitherto been associated.

The only other member of this genus is *S. limneriaeformis*, Schm., and differs in its more slender body, entirely black abdomen, sparser facial pilosity, the apical half of the flagellum flavous with the apical joint as long as the three preceding together, less distinct metanotal areae, much more strongly elevated disc of the postpetiole and the dull-white stigma. Only two German ♀♀ are known.

*S. chrysostoma* is said to be apparently rare by Schmiedeknecht, who only records it from England and Germany; Thomson, however, mentions it from Sweden, Kirchner from Italy and Tosquinet in May from Belgium. Gravenhorst was strangely ignorant of it; he took one male among undergrowth on 1st June near Pepelwitz and had only seen two females at Berlin, in Klug's collection. In Britain, on the contrary, it is one of the very commonest of the spring Ichneumonidae, though perhaps local and certainly only found in woods, where it may be beaten from young ash, birch, poplar and oak trees from 11th May to 19th June. Sometimes it is seen flying low over herbage and is not infrequently taken by sweeping. Bignell recounts (E. M. M. 1897, p. 159) how he obtained forty-three males and twenty-three females on a cloudy day sitting about the leaves of a small beech tree in the Bickleigh Woods, near Plymouth, on 5th May; this was, however, his first acquaintance with the species and, curiously enough, I first met with it at Ipswich about the same time. It has occurred to me annually since then, often in the utmost profusion, in Suffolk, in the Bentley Woods, Assington Thicks—where I beat a pair *in cop.* on 21st May, 1899 (*cf.* Trans. Leicester Soc. 1899, p. 296)—and Brandon; in Essex at Gosfield; and in the New Forest at Wilverley, Matley Bog, Brockenhurst and Denny Wood. I have not often received it, though Brunetti has sent it me from Croydon, Beaumont from Oxshott and Plumstead, Piffard from Felden in Herts., Cross from Brockenhurst and Adams from Lyndhurst. The only three records are by Marshall, who introduced it as British, under the name *Phytodietus vetulus*, in 1870, from Lastingham in Yorks, Bridgman from Earham near Norwich and Bloomfield from Guestling, near Hastings. It is evidently parasitic upon some little-bred



host, probably not lepidopterous, since we at present know nothing whatever of the economy of this abundant species. Nees von Esenbeck took several males, in the middle of May, of *L. pallidipes* flying gregariously around lime trees and dancing in the air like *Chironomi*; no females were with them.

### ARENETRA, Holmgren.

Holmgr. Ofv. 1859, p. 127; Sv. Ak. Handl. 1860, p. 46; *Lasiopts*, Holmgr. Ofv. 1854, p. 69 (*nec* Rond.).

Whole body clothed with erect, elongate, black or grey pilosity, shorter on abdomen. Head transverse, punctate and villose; eyes oval and not approximate; clypeus apically depressed and subtruncate; mandibles moderately broad, apically contracted with unequal teeth. Antennae subfiliform and in ♀ shorter than body; apical joints discreted. Thorax stout and very strongly punctate; notauli obsolete or wanting; metathorax rugosely punctate with no trace of any areae, but apically subproduced above petiole; spiracles small and subcircular. Scutellum strongly elevated and pilose, coarsely punctate and immaculate. Abdomen deplanate or in ♀ apically subcompressed, black; basal segment longer than broad and longitudinally rugose with the following much smoother; ♂ valvulae exerted; terebra shorter than abdomen and slightly reflexed. Legs slender; tarsal claws simple and somewhat large, fully double length of pulvilli; apical tarsal joint not, or in ♀ slightly, longer than penultimate and rather more than two-thirds as long as the third. Wings ample with areolet entire, large, broadly triangular and emitting recurrent nervure before its centre; radial nervure straight; transverse anal nervure of lower wing quite straight, opposite and intercepted by the pellucid nervellus at exactly its lower third.

Thomson says (O. E. viii. 758) that this genus differs from *Lissonota* only in the pilose thorax and wanting metathoracic costae; the legs, however, are finer, the apical flagellar joints rather more discreted, the thorax more coarsely punctate and the areolet has the outer nervure entire and not at all curved. Van Vollenhoven remarks upon the somewhat narrow "implantation" of the abdomen. The genus is easily recognised by the shaggy capital and thoracic villosity, wanting petiolar area and broad areolet.

The only other species included herein by Holmgren is now relegated to the Banchides, with which the present genus is distantly related in its convex scutellum, subcompressed anus and broad areolet, which, unlike *Lissonota*, emits the recurrent nervure before its centre.

1. *pilosella*, Grav.

*Tryphon pilosellus*, Gr. I. E. ii. 125, ♂. *Lasiops pilosella*, Holmgr. Ofv. 1854, p. 69, ♂ ♀. *Arenetra pilosella*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 46; Voll. Pinac. pl. xiv, fig. 1, ♂; Schm. Opusc. Ichn. 1268. *Lissonota pilosella*, Tasch. Zeits. Ges. Nat. 1863, p. 286, ♂ ♀.

Head pilose and very coarsely punctate throughout. Antennae subsectaceous, of ♀ three-quarters, of ♂ exactly as long as, the body with scape pilose; flagellum of ♀ with apical joints transverse and somewhat distinctly discreted with the last nearly circular and apically strongly obtuse; ♂ with the three apical joints subdiscreted and the last nearly twice longer than broad. Thorax gibbous and pilose, strongly punctate and immaculate. Abdomen subcylindrical and sericeous, a little narrower and distinctly longer than the head and thorax; basal segment subcanaliculate and pilose, twice longer than apically broad, longitudinally striate throughout and punctate to beyond the centre only; following segments obsoletely reticulate and nitidulous; ventral segments entirely or apically rufescent; ♂ valvulae elongately exerted, longer than seventh segment, entirely ferrugineous and apically truncate; ♀ hypopygium extending to apex of anus; terebra slightly longer than half abdomen (terebra  $2\frac{3}{4}$ , abdomen 5, mm.), fulvous and reflexed with valvulae infusate and apically truncate. Legs slender and somewhat dark fulvous; coxae and trochanters black and pilose; ♂ with at least the base of the anterior femora infusate, often hind ones mainly black, and the front tarsi darker than the hind ones. Wings normal, hyaline or in ♀ a little infumate; stigma infusate, sometimes ferrugineous internally; radix testaceous, tegulae black; areolet regularly and broadly triangular or subpentagonal, sessile. Length, 9—11 mm.

This rare species has never been recorded as British, but in the Revd. T. A. Marshall's private copy of his 1872 Catalogue, I find a note of his upon this insect: "Taken by Cameron on Ben Lawers, April 10th"; this is in Perthshire, with an altitude of nearly 4000 ft. Gravenhorst knew but a single male from Austria; Holmgren says it is *passim* in sandy places in Sweden; Taschenberg took it at Halle, in Saxony. Van Vollenhoven remarks upon its great rarity and suggests that perhaps it occurs only in the first days of spring, before collectors are in the field; it had not been found in Holland in 1876, nor in Belgium in 1897; nor has anything hitherto been published respecting its economy. At the end of 1902, Musham sent me from Lincoln a female of this insect, which he had bred from an unknown lepidopterous host on 23rd December; and on 10th of the following February a male emerged from the same batch of pupae, which he was then able to identify as those of *Phigalia pilosaria*, a common Geometrid appearing on the wing from December to March; evidently its parasite appears at the same inclement season, confirming Vollenhoven's assumption.

CRYPTOPIMPLA, *Taschenberg*.

Tasch. Zeits. Ges. Nat. 1863, p. 292.

Apical flagellar joints distinctly discreted and moniliform, not cylindrical; terebra emitted from a ventral fold and hardly longer than the basal segment; hypopygium not reaching apex of abdomen, which is obliquely truncate; basal segment distinctly convex, subglabrous and basally constricted; legs slender and subelongate; head as broad as, or broader than, thorax; wings not large.

This genus is closely allied to *Lissonota* in its circular metathoracic spiracles, subsessile areolet and mutic tarsal claws; but the apically moniliform flagellar joints, convex and arcuate basal segment and the peculiarly short terebra will at once distinguish it. For long, however, it had a precarious existence and I find a MS. note by the Revd. T. A. Marshall: "To this useless genus belong *Lissonota caligata*, Gr., *brachycentra*, Gr., *leptogaster*, Holmgr." etc. That *L. caligata* has no right to a distinct genus, I entirely concur and accordingly place it herein. The only other European species, *C. genalis*, Thoms., is not unlikely to be found with us; it is instantly known by large flavous genal marks. Few of the species of this genus have been bred, all appear of unusual occurrence both here and abroad, and probably several more await discovery.

*Table of Species.*

- |       |   |                       |
|-------|---|-----------------------|
| (2).  | 1. Tibiae spinulose; joints of apical half of flagellum discreted | 1. CALIGATA, Grav.    |
| (1).  | 2. Tibiae mutic; joints of apical third of antennae discreted.    |                       |
| (6).  | 3. Abdomen black.   |                       |
| (5).  | 4. Petiolar area basally carinate; segments immaculate            | 2. CALCEOLATA, Grav.  |
| (4).  | 5. Petiolar area not carinate; segments apically testaceous       | 3. BRACHYCENTRA, Grav |
| (3).  | 6. Abdomen broadly red.   |                       |
| (8).  | 7. Petiole basally explanate; petiolar area not carinate          | 4. ERRABUNDA, Grav.   |
| (7).  | 8. Petiole not basally explanate; petiolar area basally carinate. |                       |
| (10). | 9. Hind legs mainly black; antennae partly pale                   | 5. BLANDA, Grav.      |
| (9).  | 10. Hind legs entirely red; antennae entirely black               | 6. ANOMALA, Holmgr.   |

1. *caligata*, Grav.

*Lissonota caligata*, Gr. I.E. iii. 38, ♂; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 53; Tasch. Zeits. Ges. Nat. 1863, p. 286; Thoms. O.E. viii. 760 et xiii. 1417, ♂ ♀. *Xenacis caligata*, Schm. Zool. Jahr. 1900, p. 333; Opusc. Ichn. 1245.

Punctate, black and feebly shining with only the legs and central incisures red. Head subtriangular, closely and rugosely punctate, strongly

narrowed behind the eyes; cheeks of ♂ more buccate than those of ♀, genal costa inflexed and immaculate; palpi infusate, apex of clypeus ferrugineous or in ♂ flavescent. Antennae of ♀ attenuate towards their apices and shorter than the body with the joints of the apical half moniliform, as broad as long, subrhomboidal and of quite distinct form from those of the basal half, apical joint narrower than and hardly as long as the preceding; of ♂ setaceous, apically strongly attenuate and almost longer than the body with all the joints longer than broad, the apical ones becoming gradually shorter and distinctly discreted. Thorax closely and rugosely punctate, almost dull, immaculate; pronotal epomiae wanting; mesosternum short and punctate throughout; metathorax very closely, finely and rugulosely punctate with the areola obsolete or wanting, but the petiolar area distinct and basally nearly straight; spiracles circular. Scutellum black. Abdomen black with the central incisures ferrugineous, nitidulous, very finely alutaceous and nearly smooth; first segment somewhat narrow, basally attenuate, gradually dilated apically, nitidulous and not rugulose, with obsolete carinae; second and third subquadrate; plica black; terebra hardly longer than the basal segment. Legs normal, slender and pale red, the hind ones elongate and slender; femora attenuate towards their apices; coxae and trochanters usually entirely black with the hind coxae often castaneous above; hind tibiae and tarsi finely and sparsely spinulose, nigrescent with the base of the former rarely dull ferrugineous; hind femora red and nearly parallel-sided; all the claws infusate. Wings somewhat clouded; stigma and radius infusate, radix pale piceous and tegulae black; apical abscissa of radial nervure longer than the basal; areolet irregular and petiolate, rarely incomplete externally; nervellus subobsolete and intercepting far below the centre. Length, 10—11 mm.

The ♂ of this species is very like that of *Lissonota sulphurifera*, but the legs are a little longer and more slender, the flagellum is differently constructed and Gravenhorst says the lower exterior nervure of the interior cell is less curved; the ♀ closely resembles *Cryptopimpla calceolata*, with which it occurs in Germany in the late summer, but the antennae, again, are distinct and the median nervure of the hind wing evidently more curved.

For the reception of this single species, Förster erected his genus *Xenacis*, which differed from *Cryptopimpla* only in the ♀ having the joints of the apical half, in place of the apical third, of the flagellum distinctly discreted and a little more knob-like, less rounded above and below; it is, however, surely ridiculous to exalt such trifles, at best only good enough for specific differences, into the position of generic characters; one might suspect that explorers are so proud with themselves at finding a species to fit Förster's untypical genera that they drag it out to

proclaim: "See what I have unearthed from its most beneficial forgottenness!" If a character be needed, the external setae of the hind tibiae is much better, because occurring in both sexes.

*Lissonota caligata* was introduced as British by Bridgman (Trans. Ent. Soc. 1881, p. 167) on the strength of a female bred by Bignell, presumably in Devonshire, from *Anticlea badiata* and is recorded during the same year by Dr. Capron (Entom. 1881, p. 88) from the neighbourhood of Shere, in Surrey. I do not, however, believe that either the one or the other could distinguish between this species and *C. calceolata*, since I find both species gummied on a single card and labelled *L. leptogaster* in Capron's collection where are the only two females and one male I have seen. It is not a common species in August and September in Sweden, Prussia, Belgium and central Europe generally; the above somewhat doubtful host is the only one at present noticed.

## 2. *calceolata*, Grav.

*Phytodietus calceolatus*, Gr. I.E. ii. 937, ♀. *Cryptopimpla calceolata*, Tasch. Zeits. Ges. Nat. 1863, p. 294, ♀; Schm. Opusc. Ichu. 1249, ♂ ♀. *Lissonota leptogaster*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 55, ♂; Thoms. O.E. xiii. 1417, ♂ ♀.

A little shining, alutaceously punctate and black. Head with the clypeus of ♀ ferrugineous and of ♂, together with part of the mouth and the facial orbits, flavidous. Antennae subfiliform throughout and hardly attenuate apically with the apex obtuse, of ♀ longer than half the body, of ♂ nearly as long as the body. Thorax gibbous, black; of ♂ with a subhamate mark on either side before the radices, and a small line below them flavidous; metathorax not rugose, with circular spiracles. Scutellum black and, in ♂, with the sides more or less broadly flavous. Abdomen subpetiolate, a little longer than the head and thorax and slightly narrower than the latter, oblong-subclavate; basal segment of ♂ narrow, of ♀ gradually dilated towards the apex and twice longer than broad; second and third segments of ♂ not broader than long; terebra hardly longer than the basal segment, with the spicula red. Legs slender, red and somewhat elongate; hind tarsi and tibiae black, with the latter red or ferrugineous towards the base. Wings normal and only slightly clouded; stigma, radius and the ♀ tegulae infusate-piceous, radix and ♂ tegulae stramineous; areolet subsessile and irregularly triangular; nervellus intercepting far below the centre. Length, 8—10 mm.

Thomson first pointed out the synonymy of Gravenhorst's and Holmgren's species, and also called attention to the similarity of them to *Lissonota* (*Cryptopimpla*) *caligata* in colour and the peculiarly short terebra; he remarks, however, that in the present species the petiole is more strongly curved transversely, the vertex more angularly emarginate, the

flagellum is much less attenuate towards the apex, with the joints broader than long and not nodose, the petiolar area rises higher on the metanotum and is more curved basally, the mandibles are less stout, and the coxae and trochanters are pale; the ♂ has the mouth and clypeus, facial orbits to a little above the level of the scrobes, humeral marks and callosities, and the scutellar vittae all pale; the metathorax is less rugose and the areola is more definitely outlined. This species has nothing to do with *Lissonota deversor*, as suggested by Bridgman (Trans. Ent. Soc. 1882, p. 163).

This is probably a common, but overlooked species both here and on the Continent. The males are introduced as British in Trans. Ent. Soc. 1886, p. 368, but, as I have remarked under *C. caligata*, the females appear to have been hardly differentiated hitherto with us. Bridgman says the males are rather plentiful in the autumn around Norwich and Strumpshaw, in Norfolk; there are three females in Capron's collection, presumably from Shere in Surrey; Brunetti has given me five males, which he took in plenty, and one female, all found at Hunstanton, Norfolk, between 24th September and 1st October, 1900; and I took a single male flying about and settling upon a bramble leaf at Foxhall, in Suffolk, on 17th September, 1903.

### 3. *brachycentra*, Grav.

*Lissonota brachycentra*, Gr. I.E. iii, 56, ♀; Bridg. Trans. Ent. Soc. 1886, p. 369, ♂ ♀ (*nec* Brisch.). *Cryptopimpla brachycentra*, Schm. Opusc. Ichn. 1248, ♂ ♀.

Head punctate with the interstices finely reticulate, broader than the thorax and not strongly constricted behind the eyes; clypeus and palpi fulvo-ferrugineous, and paler in ♂, with the mandibles concolourous and apically black; inner orbits narrowly, and in ♀ more shortly, flavous. Antennae subfiliform and pubescent, longer than the body, dull ferruginous towards their apices and beneath. Thorax gibbous, pubescent and in ♀ immaculate, punctate with the interstices finely reticulate; ♂ with a small spot in front on either side of the mesonotum and the callosities flavous; petiolar area not basally carinate; spiracles circular. Scutellum subdeplanate, subquadrate and gradually a little contracted towards the apex, rendering it a little more broad than in the allied species. Abdomen rufescent-piceous or black, very finely and transversely aciculate with obsolete punctures; all the segments distinctly but narrowly testaceous apically; basal segment of ♀ twice longer than apically broad, basally nearly as broad as at apex, with the disc hardly impressed and the base not laterally explanate; second and third segments a little longer than broad; terebra about as long as the basal segment. Legs pale red and not elongate; hind tarsi and tibiae infusate with the base of the

latter rufescent. Wings normal, hyaline; stigma and radius testaceous; radix and tegulae in both sexes whitish; areolet irregular and subpetiolate, with the outer nervure sometimes entirely pellucid; nervellus intercepting at about the lower third, but its point of junction inconstant. Length, 7—8 mm.

Bridgman says it is closely allied to *C. calceolata*, but differs in having the abdomen decidedly badious and rarely black, the transverse meta-thoracic carina entirely wanting, the paler tegulae and apices of the abdominal segments and stigma, the higher interception of the nervellus and the flavidous-marked ♀ face.

It is overlooked or very rare everywhere; Gravenhorst's female was from Vienna. Bridgman's description was drawn from several examples of both sexes bred by Harwood from an unknown host, one of which, evidently sent by him to Dr. Capron, is now in my collection; he adds that Bignell has also bred a female from *Anticlea badiata*. The latter states (Trans. Devon. Assoc. 1898, p. 503) that the specimen in question emerged on 16th June, 1880, from *A. badiata*, the larva of which was obtained in south Devon during the preceding June: "I suspect," he says, "this parasite confines its attacks to this species, as it does not appear until *A. badiata* is nearly full-fed."

#### 4. errabunda, Grav.

*Phytodietus errabundus*, Gr. I.E. ii. 933, ♀. *Cryptopimpla errabunda*, Tasch. Zeits. Ges. Nat. 1863, p. 293, ♀; Schm. Opusc. Ichn. 1248, ♂ ♀. *Lissonota errabunda*, Thoms. O.E. viii. 761, ♀; xii. 1247, ♂; cf. xiii. 1416 (nec Holmgr.).

Head strongly transverse and immaculate in both sexes; face flat with short, white pilosity. Antennae as long as the body and black throughout, with the flagellar joints longer than broad. Thorax immaculate; metathorax strongly and distinctly but not coarsely punctate, with the petiolar area not carinate basally, and an indistinct central longitudinal canaliculation; spiracles circular and not very small. Scutellum black and somewhat convex. Abdomen red with segments five to seven, and in ♂ basal half of the first, black; basal segment elongate, convex and glabrous with sparse lateral pilosity and distinctly explanate subdentately on either side at its base; plica pale; terebra one-third the length of the abdomen, black with the spicula red. Legs of ♀ red with the front coxae, all the trochanters, femora except apex of the anterior, hind tarsi and tibiae except a very obsolete band before the base of the latter, black; of ♂ slender and black with only the anterior tibiae and tarsi, and the front femora, red. Wings subhyaline; stigma stramineous or testaceous; radius infusate; radix pale stramineous, tegulae black; areolet petiolate and triangular with the outer nervure partly pellucid; radial

nervure curved before its apex; anal of hind wing strongly oblique and emitting the pellucid nervellus in ♀ from its lower third and in ♂ from its lower angle. Length, 8—9 mm.

Thomson first described the ♂ in 1888; Schmiedeknecht's of 1900 is probably identical though differing in its laterally white-marked face and the colour of the hind tibiae; it is also noted by Brischke.

This species is uncommon throughout northern and central Europe; it is not recorded from Belgium in Tosquinet and Jacobs' very full Catalogue, but Brischke bred it in Prussia from *Cidaria rubidaria*, *C. sinuaria* and *C. galiaria*; he says that the cocoon is cylindrical, shining and dull red-brown. It would appear to be very rare in Britain, since none of our local lists include it and I possess but a single pair; the female was captured by Dr. Capron, presumably about Shere, in Surrey, and the male occurred to me on the flower-table of *Angelica sylvestris* in a very marshy situation on 21st August, 1898, at Barnby Broad, in northern Suffolk. I have also seen a female captured on 1st August, 1896, by Bignell at Plymbridge, in Devonshire.

### 5. *blanda*, Grav.

*Phytodietus blandus*, Gr. I.E. ii. 932, ♀. *Cryptopimpla blanda*, Tasch. Zeits. Ges. Nat., 1863, p. 293, ♀; Schm. Opusc. Ichn. 1250, ♂ ♀. *Lissonota altipes*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 53; Thoms. O.E. viii. 761, ♀; xiii. 1416, ♂ ♀. *L. subfumata*, Thoms. loc. cit. ♂ ♀. *Xenacis hungarica*, Szepl. Term. Fü., 1900, p. 30.

Head densely punctate and almost dull, in ♀ immaculate; ♂ with the palpi, cheeks, mandibular spots, clypeus, facial orbits, facial spots or oblique lines, and the vertical dots, flavous. Antennae slender, filiform, of ♀ slightly shorter and of ♂ longer than the body, ferrugineous and becoming apically nigrescent with the two basal joints black. Thorax densely punctate, gibbous and in ♀ immaculate; ♂ with hamate humeral marks and a callosity before the radix flavous; metathorax more finely punctate than the mesonotum and apically smoother; petiolar area basally carinate; spiracles circular. Scutellum black. Abdomen subpetiolate and becoming gradually incrassate apically, a little longer and narrower than the head and thorax; basal segment gradually dilated towards its apex, not basally explanate, twice longer than broad, subcanaliculate and, like the three following, red; ♂ with first segment basally and the following sometimes laterally black; second quadrate and the remainder transverse; fourth sometimes apically, and the fifth entirely or apically, like the remainder, black; plica infusate; terebra hardly longer than the basal segment, black with the spicula red. Legs slender, rufo-castaneous with the coxae sometimes infusate and the anterior of the ♂ flavous; hind tarsi, tibiae and apices of their femora nigrescent. Wings normal or rather small, in ♀ distinctly and in ♂ slightly clouded; stigma,



radius and ♀ tegulae infusate, ♂ tegulae flavous; areolet irregularly sub sessile. Length, 8—10 mm.

The ♀ somewhat resembles that of *C. errabunda*, but the antennae and legs, and especially the hind coxae are paler, the abdomen is more rounded laterally; and the transverse metathoracic carina, which is wanting in the latter species, at once distinguishes it.

This species is probably as common with us as it is upon the Continent, but there is a great paucity of records. I have seen females taken by Beaumont at Colwyn Bay, in Radnorshire, in August, 1890, and by myself on herbage in the marshes at Eaton, near Norwich on 9th June, 1901; Bridgman also took males in the same neighbourhood at Earlham and at Buckenham Ferry, in the Norfolk Broads. It has not yet been bred.

### 5. *anomala*, Holmgr.

*Lissonota anomala*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 52, ♀. *Cryptopimpla anomala*, Schm. Zool. Jahr. 1900, p. 338, ♀; Brauns, Zeits. Hym. Dip. 1901, p. 159; Schm. Opusc. Ich. 1250, ♂ ♀.

Obsoletely punctate, black and very little shining. Head with the palpi dull testaceous and basally nigrescent; mandibles piceous; clypeus of ♀ flavescent and basally black; ♂ also with the inner orbits and apex of clypeus white. Antennae as long as the body and nigrescent throughout. Thorax shagreened and dull; and of ♀ immaculate, of ♂ with humeral marks and callosity before the radix white; notauli wanting; metathorax with lateral costae entire; petiolar area obsolete and laterally striate, but with the basal costa curved and centrally distinct; spiracles circular and not very small. Scutellum black and somewhat convex. Abdomen a little longer than the head and thorax, finely reticulate and not strongly nitidulous; segments two to four, apex of the first, and in ♂ base of the fifth, red; basal segment of ♀ gradually explanate throughout, twice longer than broad with the apex double breadth of base which is not laterally explanate, laterally margined with spiracles a little before the centre, and the disc convex with a central shallow fovea; central segments of ♀ quadrate; terebra about as long as half the abdomen. Legs unicolorous red throughout; ♂ with the hind trochanters infusate. Wings of ♀ slightly clouded, of ♂ hyaline; stigma and nervures testaceous, radix and tegulae in both sexes white; areolet sessile and regularly triangular, emitting recurrent nervure from its centre; radial nervure not curved; anal of lower wing subopposite and emitting the pellucid nervellus from its lower third. Length, 7—9 mm.

Holmgren says that the very short terebra together with the colour of the legs and abdomen will distinguish this species, which in size and conformation is similar to his *Lissonota erythrina*, but the petiolar area is less definite, etc.

It would appear to be very rare in Sweden and Germany, whence alone it is recorded. Bridgman mentions (Trans. Ent. Soc. 1882, p. 162) a doubtful female from Wickham differing, he says, from the present species only in having the central abdominal segments rather longer than broad, the wings hyaline and their nervures black. I am, therefore, glad to be able to confirm its right to inclusion in our list by recording a female, kindly given me by Mr. William Evans, F.R.S.E., of Edinburgh, who swept it from herbage near Currie, in Midlothian, on 11th June, 1906; it agrees in every way with Holmgren's description and differs from *C. blanda* in its longer and entirely black antennae, slightly longer terebra, white tegulae, entirely red legs, basally black abdomen and larger wings.

### LISSONOTA, *Gravenhorst*.

Gr. I. E. iii (1829), 30.

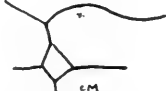
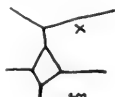
Head transverse and neither buccate nor elongately pilose; clypeus discreted, somewhat convex and apically rounded. Antennae filiform or apically subattenuate with the flagellum normal, its apical joints not moniliform nor discreted. Thorax subcylindrical, longer than high; mesonotum often vittate; metathorax punctate or scabriculous with areola incomplete and often entirely wanting; basal costa of petiolar area distinct and nearly always strong; spiracles small and circular. Scutellum normal, often pale-marked. Abdomen narrow and deplanate, somewhat smooth, not tuberculate nor obliquely incised, usually closely and finely punctate or alutaceous; segments not apically elevated; the basal elongate, sessile, rarely subquadrate; hypopygium always covering base of terebra and sometimes nearly reaching anus; terebra slender and usually as long as, or longer than, the abdomen. Legs somewhat slender with the tarsal claws not pectinate, though sometimes subsetiferous basally. Wings with a more or less distinct, and often petiolate, triangular areolet.

The species falling herein are entirely homogeneous and at once known from those of the surrounding genera by their elongate and narrow abdomen, mutic tarsal claws, circular metathoracic spiracles, evenly sculptured and excostate metanotum, elongate terebra and the fairly constant shape of the normally entire areolet. The genus is divisible into four sections, the first two of which have among other somewhat occult characters the body broadly red and the first the radial nervure curved at the apex of its basal abscissa above the areolet, where in the second it is straight; the fourth section is the most extensive and difficult to determine, since its species are closely allied and for the most part uniform in colour though not in outline, and I myself have nine specimens belonging to it still unnamed; the third section, at once known by its large size and elongate tarsal claws, is very closely related to *Meniscus* both in structure and economy, though at once distinguishable by its simple onyches.

Nearly all our species are found only in the late summer and autumn, though that there are exceptions is proved by my capture of *L. bellator* and *L. varicoxa* in the middle of June. Few appear to be rare and then more on account of the difficulty arising from originally inadequate descriptions than lack in prevalence of the insects.

I have found the species already recorded from Britain to include all those I have had occasion to examine, though of course the old lists also contained many now considered to belong to distinct genera, with I think but a single exception in the puzzling *L. segmentator*-group, which will doubtless yield more species when adequately investigated. It is in this group, more perhaps than any other in the Lissonotides, where the question of constancy in the terebral length is in need of settlement: I myself am convinced that it varies not the slightest in females of a single species.

*Table of Species.*

- |       |   |  |                      |
|-------|---|--|----------------------|
| (6).  | 1. Radial nervure arcuate above areolet (figured); thorax profusely flavous-marked. |   | 1. PARALLELA, Grav.  |
| (3).  | 2. Metathoracic spiracles elongate; abdomen not confluent punctate ..               |  | 2. LINEATA, Grav     |
| (2).  | 3. Metathoracic spiracles circular; abdomen confluent punctate.                     |  | 3. INSIGNITA, Grav.  |
| (5).  | 4. Postscutellum flavous; legs and antennae normal .. .. .                          |  |                      |
| (4).  | 5. Postscutellum black; legs and antennae elongate .. .. .                          |  |                      |
| (1).  | 6. Radial nervure not arcuate (figured); thorax less flavous-marked.                |  | 4. LEUCOGONA, Grav.  |
| (28). | 7. Abdomen centrally more or less broadly red.                                      |  |                      |
| (23). | 8. Vertical orbits immaculate; terebra usually shorter than body.                   |  |                      |
| (16). | 9. Central segments quadrate or transverse; areolet distinct.                       |  |                      |
| (11). | 10. All the tibiae basally white; face and cheeks sparsely pilose .. .. .           |  |                      |
| (10). | 11. All the tibiae uniformly red or infusate.                                       |  |                      |
| (13). | 12. Face and cheeks densely pubescent   |  | 5. FLETCHERI, Bridg. |
| (12). | 13. Face and cheeks sparsely pilose.  |  |                      |
| (15). | 14. Thorax and scutellum immaculate ..  |  | 6. VICINA, Holmgr.   |
| (14). | 15. Thorax and scutellum each with two white marks. . . . .                         |  | 7. QUADRINOTATA. Gr. |
| (9).  | 16. Central segments elongate.  |  |                      |
| (20). | 17. Areolet petiolate and obsolete; segments black-marked.                          |  |                      |
| (19). | 18. Terebra shorter; ♂ face pale-marked; length 6 mm. . . . .                       |  | 8. LINEARIS, Grav.   |
| (18). | 19. Terebra longer; ♂ face immaculate; length 3 mm. . . . .                         |  | 9. OBSOLETA, Bridg.  |
| (17). | 20. Areolet entire and often sessile; central segments immaculate red.              |  |                      |

- (22). 21. Third segment transverse ; terebra shorter . . . . . 10. *NITIDA*, *Bridg.*
- (21). 22. Third segment elongate ; terebra longer . . . . . 11. *SUBACICULATA*, *Bridg.*
- (8). 23. Vertical orbits white-marked ; terebra as long as body.
- (27). 24. Eyes internally divergent ; second segment subnitidulous and finely punctate.
- (26). 25. ♂ length 7 mm. ; hind coxae mainly black . . . . . 12. *BELLATOR*, *Grav.*
- (25). 26. ♂ length 9 mm ; hind coxae sparsely black (♀ unknown) . . . . . 13. *ARGIOLA*, *Grav.*
- (24). 27. Eyes internally parallel ; second segment dull and distinctly punctate . . . . . 14. *VARIIPES*, *Desv.*
- (7). 28. Abdomen black, at most with the incisures narrowly pale.
- (34). 29. Tarsal claws double length of pulvilli ; length 8 mm. or more.
- (31). 30. Central segments badius, nitidulous and not punctate . . . . . 15. *CYLINDRATOR*, *Vill.*
- (30). 31. Central segments black, duller and closely reticulate.
- (33). 32. Hind tibiae red ; central segments sparsely punctate . . . . . 16. *SULPHURIFERA*, *Gr.*
- (32). 33. Hind tibiae black ; central segments not at all punctate . . . . . 17. *FEMORATA*, *Holmgr.*
- (29). 34. Tarsal claws hardly longer than pulvilli ; size usually smaller.
- (48). 35. Second and usually third abdominal segment elongate.
- (39). 36. Mesonotum red-marked.
- (38). 37. Mesonotal vittae alone pale ; ♂ incisures white . . . . . 18. *CULICIFORMIS*, *Gr.*
- (37). 38. Mesonotum entirely red ; ♂ incisures not white . . . . . 19. *HALIDAYI*, *Holmgr.*
- (36). 39. Mesonotum not at all red.
- (43). 40. Vertical dots and often scutellum pale.
- (42). 41. Terebra as long as body ; ♂ scape pale beneath . . . . . 20. *VARIABILIS*, *Hlmgr.*
- (41). 42. Terebra as long as abdomen ; ♂ scape immaculate . . . . . 21. *RUFOMEDIA*, *Bridg.*
- (40). 43. Vertical dots and scutellum immaculate.
- (45). 44. Body strongly nitidulous ; length 12 mm. . . . . 22. *FRONTALIS*, *Desv.*
- (44). 45. Body not strongly nitidulous ; length 10 mm. or less.
- (47). 46. Stigma testaceous ; ♀ antennae shorter than body . . . . . 23. *UNICINCTA*, *Holmgr.*
- (46). 47. Stigma black ; antennae as long as body (♂ unknown) . . . . . 24. *TROCHANTERALIS*, *D.T.*
- (35). 48. Second segment quadrate or transverse.
- (56). 49. Vertex not emarginate ; length at least  $6\frac{1}{2}$  mm.
- (51). 50. Scutellum laterally, and often mesonotal vittae, flavous . . . . . 25. *DEVERSOR*, *Grav.*
- (50). 51. Scutellum, and mesonotum discally, immaculate.

- (53). 52. Incisures not pale . . . . . 26. *CARBONARIA*, *Hlmgr.*  
 (52). 53. Incisures rufescent.  
 (55). 54. Front coxae and hind tibiae entirely red . . . . . 27. *TRANSVERSA* *Bridg.*  
 (54). 55. Front coxae stramineous, hind tibiae apically black . . . . . 28. *VARICOXA*, *Thoms.*  
 (49). 56. Vertex emarginate; length at most 6 mm.  
 (62). 57. First segment constricted to base; terebra shorter than body; ♂ face black.  
 (61). 58. Antennae filiform throughout; legs entirely red.  
 (60). 59. Head not broader than thorax; areolet sessile . . . . . 29. *SEGMENTATOR*, *Fab.*  
 (55). 60. Head broader than thorax; areolet petiolate . . . . . 30. *DISTINCTA*, *Bridg.*  
 (58). 61. Antennae subincrassate apically; hind trochanters black . . . . . 31. *NIGRIDENS*, *Thoms.*  
 (57). 62. First segment subparallel; terebra as long as body; ♂ face flavous-marked.  
 (64). 63. Basal segment gently arcuate throughout; hind coxae red . . . . . 32. *ERRABUNDA*, *Holmgr.*  
 (63). 64. Basal segment deplanate and canaliculate; hind coxae black . . . . . 33. *DUBIA*, *Holmgr.*

# 1. *parallela*, *Grav.*

*Lissonota parallela*, Gr. I.E. iii. 79, ♂ ♀; Schöff. F.G. cxvi. 18, ♂; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 49; Tasch. Zeits. Ges. Nat. 1863, p. 282; Thoms. O.E. viii. 764 et xiii. 1420, ♂ ♀. Var. *L. perspicillator*, Gr. I.E. iii. 86, ♂ ♀. Var. *L. nigricoxis*, Strobl. Mit. Ver. Steier. 1901, p. 23.

Punctate, black and somewhat shining. Head black with the apices of the mandibles concolorous; mouth of ♀ red, of ♂ flavous as also are its face and in both sexes more or less of the orbits; ♂ with the clypeus rufescent and the face centrally black-lined. Antennae slender, as long or nearly as long as the body, ferrugineous beneath towards their apices or in ♂ throughout; rarely in ♀ immaculate; scape of ♂ sometimes pale beneath. Thorax punctate, of ♀ sometimes entirely black but often, as in the ♂ always, partly with the sternum partly or entirely red, the propleurae and mesopleurae flavidous-marked, the pronotum as well as marks beneath the radix and the two mesonotal vittae which usually coalesce with concolorous anteradial lines, flavous; metathorax with the petiolar area entire and spiracles elongate. Postscutellum and the sides of the scutellum, as well as in ♂ its apex, flavous. Abdomen linear, cylindrical, discally nitidulous, slightly longer than the head and thorax and, especially in ♂, narrower than the latter; two basal segments punctate; second and third a little longer than broad, punctate and finely marginate; three

basal segments red or fulvous, apically or centrally or mainly black, and the following black with the fifth sometimes basally red; of ♂ red with the anus more or less broadly nigrescent; basal segment a little longer than the hind coxae, deplanate, not elevated and shining with the apical margin punctate throughout: hypopygium deeply cleft apically; terebra black, distinctly longer than the body or fully double length of the abdomen, with spicula castaneous. Legs slender, red with the hind tarsi infusate; ♂ with the coxae flavous-marked; ♀ with apices of trochanters and usually also of the tibiae nigrescent, rarely with all the coxae more or less concolorous. Wings of ♂ ample and hyaline, of ♀ normal and somewhat clouded; stigma and radius infusate, former in ♂ basally whitish; radix and tegulae pale flavous; areolet irregular and petiolate, of ♂ rarely subpetiolate; external radial nervure basally curved. Length, 9—11 mm.

Gravenhorst mentions two varieties: the first, a ♀ with the thorax entirely black discally and only the faintest vestige of lateral flavescence on the scutellum; the second, both sexes almost entirely red with the scutellum flavous-lined, the head above and the thorax discally black; Holmgren had a ♀ with the thorax mainly red; and the var. *perspicillator* is said to exactly agree with the typical form by Gravenhorst and to be intermediate between it and *L. cylindrator*; it differs from the present species in having the abdomen basally black, the scutellum often entirely black in the ♀ or only white-dotted in the ♂ and in other minor differences of colour.

The transverse and somewhat elongate metathoracic spiracles do not appear hitherto noted and relate this species with *Syzeuctus*.

The ♀ is similar to *L. bellator*, but very much larger with the terebra longer and the scutellum laterally pale-marked. It is, perhaps, most closely allied to *L. lineata* (with which I am inclined to suspect Holmgren confused it), but may be known by the much greater length of the terebra, not flavescent ♂ basal segment and, in both sexes, by the nitidulous and not confluent punctate abdomen.

*L. parallela* is said to be not uncommon throughout Europe on umbelliferous flowers in July and August and, in Sweden, to frequent sandy places on the coast; but no one appears to have yet bred it. It is recorded by Bridgman from Earlham, near Norwich, and in the Victoria History from Essex and Hastings. I have seen females taken at Christchurch in Hants. by Bradley early in August; at Forres, near Elgin, in Scotland in September, 1892, by Chitty; at Luffness Links, near Edinburgh, by Evans in September and both sexes at Kilmore in Ireland on 11th—13th August, 1898, by Beaumont. One of the females from this last collection is now in my own and seems remarkable for the length of the terebra, which

most authors are content to state is longer than the body; Gravenhorst gives it as twice or more than twice the length of the abdomen and Tosquinet says of the var. *perspicillator*, which he considers to be a good species (Ann. Soc. Belg. 1897, p. 308) that it is un tiers plus longue que tout le corps; in my female the body is  $10\frac{1}{2}$  mm. in length, the terebra  $15\frac{1}{2}$  mm.

## 2. *lineata*, Grav.

*Lissonota lineata*, Gr. I.E. iii. 82, ♂; Bridg. Trans. Ent. Soc. 1886, p. 372; Thoms. O. E. xiii. 1420, ♂ ♀. *L. bellator*, var., Tasch. Zeits. Ges. Nat. 1863, p. 284, ♂.

Head with the palpi stramineous or infusate; labrum, mandibles except their apices, clypeus, all the orbits and in ♂ two longitudinal facial lines, flavous though less distinct in ♀. Antennae as long or nearly as long as the body, subsetaceous and slender; two basal joints black and in ♂ flavous or ferrugineous beneath; remainder infusate or ferrugineous beneath. Thorax not red marked; two mesonotal vittae often anteriorly coalesced with the elongate preradial lines, margin of pronotum, propleural lines or dots and a dot before the hind coxae, flavous and less distinct in ♀; ♂ also with mesopleurae broadly flavous longitudinally below; metathorax evenly and scabriculously punctate with petiolar area basally strong; spiracles small and circular. Post-scutellum, and sides and apex of scutellum, always flavous. Abdomen very finely punctate and a little shining; basal segment black, either with the apical margin in ♂ flavous or with the apex broadly red; the three following red, with the apical margin sometimes flavescent and lateral black marks on the second; fifth of ♂ red, generally more or less extensively black on all the margins; the following black with base of the sixth sometimes rufescent; second and third segments of ♀ a little, of ♂ distinctly, longer than broad; terebra slightly longer than the body (body 8, terebra  $8\frac{3}{4}$ , mm.). Legs fulvescent; coxae and trochanters black, of ♂ nearly always flavous beneath and often with the front trochanters entirely fulvous. Wings subhyaline; stigma and radius infusate; radix and tegulae white; areolet nearly regular, petiolate or subpetiolate. Length, 8—9 mm.

The ♂ rarely has the coxae, as in the ♀, immaculate black; and I possess several ♀ ♀ with the areolet of the wing utterly wanting, though in all other respects quite typical.

This species may instantly be recognised by the invariably pale postscutellum. It is very like *L. insignita*, with which Bridgman was inclined to synonymize the ♂, but in ♀ the apex and sides of the scutellum and the postscutellum, and vittae on the mesonotum are whitish, in ♂ all the coxae are whitish-marked and the mesosternum

bears a white longitudinal spot. Its markings much resemble those of *L. parallela*, but the terebra is only slightly longer than the body, the thorax more compressed, segments two and three castaneous, somewhat dull, shorter and suffused, with the apex of the first stramineous or fulvous.

*L. lineata* was erroneously synonymised in Marshall's Catalogue with *L. bellator* and we have no specific records of it till Bridgman (*loc. cit.*) recorded six females and four males bred in England from *Crambus contaminellus*. I captured nine specimens of both sexes by sweeping flowers of *Statice limonium* and marram grass in the salt-marshes by the sea shore, where *Crambus geniculatus* was abundant, at Holme in Norfolk, on 19th of August, 1906; I possess one male taken by Dalglish at Irvine Moor, on the Ayrshire coast, on 12th August, 1899, and several of both sexes in Capron's collection but, like all his specimens, with no locality though he has recorded them (*Entom.* 1880, p. 88) as bred during the summer of 1879, by Mr. Buckler, of Emsworth, from *C. contaminellus*. It is sparsely distributed throughout central and southern Europe; and Tosquinet records specimens of eleven millimetres from Ostend in August. Both sexes on marram grass by the sea at Lowestoft.

### 3. *insignita*, Grav.

*Lissonota insignita*, Gr. I.E. iii. 84; *Tasch. Zeits. Ges. Nat.* 1863, p. 282, ♂; *Schm. Zool. Jahr.* 1900, p. 363, ♂ ♀. *L. verberans*, Gr. I.E. iii. 93; *Holmgr. Sv. Ak. Handl.* 1860, n. 10, p. 51; *Tasch. Zeits. Ges. Nat.* 1863, p. 285, ♀; *Thoms. O.E.* viii. 764 et xiii. 1420, ♂ ♀.

Cylindrical, narrow, punctate, black and a little shining. Head narrowed behind the eyes; all in ♂, frontal and external in ♀, orbits narrowly and centre of mandibles flavous; labrum and apex of clypeus pale; frons somewhat concave. Antennae slender and in ♀ hardly attenuate apically, nearly as long as the body, slender, subsetaceous and sometimes dull ferruginous beneath. Thorax with margin of pronotum and propleurae whitish in both sexes; ♂ also with two longitudinal and sometimes centrally interrupted mesonotal vittae, anteriorly coalescing with elongate preradical lines, flavous; but with mesopleurae immaculate; metathorax evenly scabriculous with no trace of areola, but petiolar area basally strong; spiracles small and circular. Scutellum flavous with its centre more or less broadly black; postscutellum immaculate. Abdomen black; basal segment of ♀ punctate, distinctly curved and somewhat longer than the hind coxae; three basal segments punctate and longer than broad; second and third except sometimes obsolete lateral dots, fourth of ♂ entirely and of ♀ more or less broadly basally, castaneous; ♂ with fifth except apically, and sometimes base of sixth, concolorous; ♂ valvulae exerted, black, glabrous and as long as the seventh segment;



terebra as long as the body or nearly double length of abdomen, with spicula castaneous. Legs slender, red; coxae and trochanters black with the anterior in ♂ pale-marked; intermediate femora of ♀ sometimes basally infuscate; hind legs somewhat elongate with the ♀ coxae and trochanters black; hind femora infuscate, beneath and generally apically rufescent, sometimes also mainly red above, but in ♀ occasionally totally black. Wings of ♂ hyaline, of ♀ a little clouded and somewhat narrow; stigma and radius infuscate with base of former pale; radix and tegulae whitish, with the latter in ♀ black; areolet petiolate and nearly regular; nervellus intercepting far below the centre. Length, 9—11 mm.

The ♂ of this species is very like *L. parallela* in shape and sculpture, but the puncturation is denser, rendering it duller, and the colouration is less bright. Gravenhorst himself thought his *L. insignita* was probably the ♂ of *L. verberans*; he adds that the latter is similar to *S. bicornis*, but with the frons mutic. The ♂ differs from that of *L. lineata* in having the postscutellum and centre of face, as well as the mesopleurae, entirely black; it is longer and more slender throughout with the central segments immaculate red, the hind femora darker, and the legs and antennae more elongate.

It is said to be an uncommon species in northern Europe; and in Belgium the female occurs in July and August. There are only three records of its capture in Britain; Bignell says he took *L. insignita* at Plym Bridge, in Devonshire, on 24th of August and Bridgman also records the male from Eaton, near Norwich, adding that it has been bred in Britain from *Cleodobia angustalis* by Fletcher; *L. verberans* is said in the Victoria History of Sussex to have been found at Camber, near Hastings. I have been so fortunate as to capture two males by sweeping bracken in a marshy place at Butts Lawn, near Lyndhurst, in the New Forest, on 17th August, 1901; these are the only specimens of that sex I have seen. The female is not quite so rare; Capron took it at Shere, in Surrey; Tuck at Aldeburgh, in Suffolk, in the middle of September, 1899; Tomlin found it on flowers of *Angelica sylvestris* on the 23rd of the same month, at Foxhall, near Ipswich; and I swept another at Brandon, in the same county, on 27th September, 1907.

#### 4. *leucogona*, Grav.

*Lissonota leucogona*, Gr. I.E. iii. 100, ♀; Bridg. Trans. Ent. Soc. 1881, p. 167.

A small black species with the legs and centre of abdomen red, and the tibiae basally white. Head obliquely narrowed behind the eyes, black, finely and closely punctate, dull; vertex immaculate, not very narrow and slightly canaliculate between the ocelli; frons deplanate;

face subtransverse, evenly and distinctly punctate throughout, immaculate, with the epistoma longitudinally prominent; mandibles and apex of the glabrous and nitidulous clypeus flavescent; palpi testaceous. Antennae filiform and immaculate throughout, not unusually slender and distinctly shorter than the body; apical joints normal. Thorax black and rarely immaculate (form typ.); but usually with the pronotum, callosity below the radix and a subcircular spot on either side of the evenly and distinctly punctate mesonotum, flavous; mesopleurae evenly punctate throughout and nitidulous; metathorax reticulate and not very closely punctate with the areola laterally indicated by two subparallel lines and the petiolar area basally strong; spiracles small and circular. Scutellum black (form typ.); but sometimes dull red, rarely bright flavous, laterally towards its base. Abdomen subcylindrical, as long and broad as the head and thorax, densely aciculate-punctate and dull, becoming more nitidulous towards the anus; basal segment only slightly longer than broad, a little more coarsely punctate and subcanaliculate to beyond its centre, transversely impressed before its apex, and black with the apex at least laterally red; second and third segments quadrate and dull red, with a discal black fascia or infusate lateral dots; the remainder black, sometimes with the fourth partly or wholly red; terebra longer than the abdomen (abdomen 4, terebra  $4\frac{3}{4}$ , mm.), infusate with the spicula red. Legs neither elongate nor slender; red, with only the base of all the tibiae white. Wings iridescent-hyaline; stigma and radius piceous; radix and tegulae pale stramineous, the latter sometimes basally infusate; areolet irregularly triangular and not petiolate; radial nervure straight, nervellus intercepting at the lower third. Length, 6—7 mm.

It is like *L. bellator* in size and colour, but the legs and antennae are shorter and stouter, the abdomen duller, vertex immaculate, terebra much shorter and it may at once be known from the rest of the species of this genus by the distinctly white base of all the tibiae. Gravenhorst says it is similar to *Lampronota accusator*, but with the legs more slender and terebra longer. Schmiedeknecht, who overlooks Bridgman's reference to it (*loc. cit.*), treats it as an insufficiently described species, which the above account will now obviate, and following Thomson (O. E. xiii. 1425), suggests (Opusc. Ichn. 1323) its synonymy with *L. carinifrons*, Thoms., which, however, has no white marking on the tibiae, the humeral marks always and the vertical orbits often pale, etc., though in most respects they appear analogous.

I have seen no ♂ with basally white tibiae, as one would anticipate this species to possess, in default of which the var. *arvicola* of *L. bellator* might be suggested to fill this position.

Gravenhorst knew but a single specimen, taken about Warmbrunn; and it does not seem to have been found on the Continent since 1829.

I possess the specimen recorded by Bridgman and by Rev. E. N. Bloomfield (E. M. M. 1881, p. 258), which the latter took in a sand-pit at Guestling, near Hasting, in September; as well as another taken by the latter in the same locality in 1876 and named *L. bellator* by the former. It is probably not very common, though doubtless often passed over and mixed among the abundant *L. bellator*, with which it occurs. Mr. Bankes has given me three specimens, which he caught at Corfe Castle in Dorset on 29th June, 1896, and 10th July, 1901; Mr. Tuck has found it at Bury and Tostock, in Suffolk, in July; and I have taken it on 20th July, 1906, on my bedroom window in Monks' Soham House in the same county and in my father's greenhouse at Ryde, in the Isle of Wight, on 11th August, 1902. From the position of these captures, one might regard it as probably a garden insect.

### 5. *Fletcheri*, Bridg.

*Lissonota Fletcheri*, Bridg. Trans. Ent. Soc. 1882, p. 163; Schm. Zool. Jahr. 1900, p. 380; Opusc. Ichn. 1315, ♂ ♀. (?) *L. pygmaea*, Strobl. Mit. nat. Ver. Steier. 1901, p. 26, ♂.

Black, densely and finely punctate with the interstices reticulate. Head transverse, slightly narrowed behind the eyes; cheeks subbuccate and densely pubescent; face transverse and apically clothed with fine and dense white pubescence. Antennae of ♂ rather shorter than the body, of ♀ rather longer than half the body; basal flagellar joint a little longer than the second and about thrice longer than broad. Thorax and scutellum immaculate. Abdomen black with segments two to four entirely, apex of the first and base of the fifth, red; basal segment about as long as the hind coxae, gradually explanate apically throughout, apex double breadth of base and distinctly though finely aciculate; second segment quadrate, remainder transverse; second and third not at all nitidulous; terebra as long as the abdomen. Legs red, with all the coxae and trochanters entirely black. Wings with the stigma infusate, radix flavous; nervellus intercepting at the lower fourth; areolet small and elongately petiolate. Length,  $6\frac{1}{4}$  mm.

This species, for which I at first mistook *L. nitida*, appears to be rendered distinct, in the *Bellator*-group, by its immaculate head and coxae, densely pubescent cheeks and apex of face and petiolate areolet.

It was described from specimens bred by Mr. J. E. Fletcher, of Worcester, from *Gelechia lentiginosella*. Strobl's doubtfully synonymous male is from Styria in Austria.

6. *vicina*, *Holmgr.*

*Lissonota vicina*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 57, ♀; Thoms. O.E. xiii. 1423, ♂ ♀. Var. (?), Brisch. Schr. Nat. Ges. Danz. 1880, p. 122, ♂ ♀.

Alutaceously punctate and somewhat shining, black. Head moderately large, broader than thorax, finely and somewhat roughly punctate, dull, strongly narrowed behind the eyes with mouth and clypeus fulvescent; face apically explanate; ♀ mandibles pale, ♂ piceous. Antennae stout, a little shorter than the body and subattenuate towards their apices; basally dull red beneath. Thorax immaculate, narrower than the head, finely and somewhat rugosely punctate, dull; mesopleurae also dull and alutaceously punctate; metathorax finely scabriculous with the areola more or less distinct. Scutellum black. Abdomen oblong-ovate; basal segment somewhat broad, gradually a little narrowed basally, roughly striate, hardly longer than the hind coxae and apically rufescent; second and third segments infusate ferrugineous, broadly in former and narrowly in latter paler apically, transverse and finely rugulose; terebra straight and nearly as long as the abdomen. Legs normal, red; coxae and trochanters of ♂ black. Wings slightly but distinctly clouded and somewhat small; stigma pale infusate, radix and tegulae stramineous; areolet irregular, sessile, with its external nervure in ♀ obsolete or wanting, nervellus nearly antefurcal. Length, 4—5 mm.

Holmgren says this species is similar to *L. segmentator*, differing in the broader and not scabriculous basal segment, and the head which is broader than the thorax; Thomson thought it possibly synonymous with *L. linearis*, Grav. Very like *L. obsoleta*, but with the central segments transverse.

It is said by Schmiedeknecht to be sparsely distributed in northern and central Europe. It is recorded by Bridgman from Earlham, near Norwich (Trans. Norf. Soc. 1893, p. 631) with no note respecting its novelty as British.

7. *quadrinotata*, *Grav.*

*Lissonota quadrinotata*, Gr. I.E. iii. 58; Tasch. Zeits. Ges. Nat. 1863, p. 282, ♀.

Head with the mouth fulvo-stramineous and base of the mandibles black. Antennae porrect and a little shorter than the body. Thorax gibbulous and cylindrical with two triangular white marks on the anterior margin of the mesonotum. Scutellum with two short white lines. Abdomen cylindrical, as long and broad as the head and thorax; the two basal incisures deeply impressed; basal segment with a deep transverse

impression before the apex and its apical angles bright castaneous; second and third bright castaneous with a black fascia; fourth laterally concolorous; terebra a little longer than the abdomen with the spicula badius. Legs somewhat slender and entirely red. Wings normal, hyaline; stigma and radius nigrescent; radix and tegulae whitish stramineous; areolet irregular and subpetiolate. Length, 7 mm.

Thomson says of his *L. carinifrons* (O.E. 1425) "This species agrees entirely with Gravenhorst's *L. quadrinotata*, but the tibiae have a basal white ring, which character he reserves for *L. leucogona*, which may be a variety with unspotted scutellum and mesonotum." With our present better knowledge of the former, this appears to me improbable.

No one has been able to find this "species" since Gravenhorst took his unique female near Gottingam; Schmiedeknecht suggests that it may be synonymous with *Glypta haesitator*, but I consider this extremely improbable. In the present genus, it would appear more closely allied in general colouration to *L. deversor*.

Marshall burdened our Catalogue with this name in 1870.

### 8. *linearis*, Grav.

*Lissonota linearis* Gr. I. E. iii, 105; Brisch. Schr. Nat. Ges. Danz. 1880, p. 119, ♀; Schm. Zool. Jahr. 1900, p. 388, ♂ ♀. *L. bellator*, var., Tasch. Zeits. Ges. Nat. 1863, p. 284, ♀. *L. bicincta*, Szepl. Term. Füz. 1900, p. 36, ♀. *Lampronota semirufa*, Desv. Cat. 81, ♀. Var. Bridg. Trans. Ent. Soc. 1882, p. 162, ♀.

Black. Head narrowed behind the eyes; ♂ with the mouth, clypeus, face laterally and vertical dots, stramineous. Antennae subfiliform, a little longer than half the body; scape of ♂ stramineous beneath. Thorax gibbulous, cylindrical; of ♂ with callosity before the radix and sometimes mesonotal marks stramineous; metathorax with a shallow longitudinal impression distinctly outlining the areola. Scutellum black. Abdomen narrow, linear, cylindrical, narrower and a little longer than the head and thorax, of ♂ with all the incisures distinctly stramineous; two basal segments of ♀ black with their apices red or fulvous, the first of ♂ more than twice longer than broad; third and fourth of ♀ entirely or apically rufescent and the following black; three basal segments finely rugose with the remainder becoming more glabrous towards the anus; second and third longer than broad, fifth of ♂ quadrate; terebra longer than the abdomen, black with spicula red. Legs slender, red or fulvous with the trochanters infuscate and the hind tarsi, often also part of their coxae, fuscous; ♂ with the anterior coxae and trochanters flavescent with black markings and the hind coxae, except at apex, black. Wings subhyaline and iridescent; stigma picous or stramineous, radius infuscate,

radix and tegulae whitish ; areolet either entirely wanting or irregularly subtriangular, petiolate or subpetiolate with the outer nervure obsolete or wanting, of ♂ small. Length, 6—7 mm.

[I have little or no doubt that the typical specimen of *L. semirufa*, Desv., still extant in the British Museum and from which I have taken the following short description, is synonymous with this species :—

Head with the clypeus, mandibles and palpi stramineous ; face immaculate, closely and evenly punctate. Antennae slender and filiform ; apically obtuse with the apical joints not distinctly discreted ; immaculate. Thorax with a flavous hamate line on anterior margin of mesonotum and callosity before the radix flavous ; spiracles small and circular. Scutellum said by Desvignes to be immaculate, but it is entirely destroyed by a pin ; in his variety it is said to have a white dot on either side. Abdomen castaneous-red and sessile ; basal segment deeply canaliculate towards the base, with a large discal black spot ; remainder more or less similarly marked discally ; apical segments darker ; terebra nearly as long as the body. Legs nearly entirely red. Wings with the stigma darker than the pale tegulae, and radius infusate ; areolet orbicular with the external nervure pellucid and obsolete, though traceable. Length, 7 mm.]

Bridgman gives (*loc. cit.*) a variety of the ♀ with the second segment entirely red and the terebra only as long as the abdomen ; he adds that the head is transverse and narrowed behind the eyes, the basal segment bears a canaliculation apically bounded by a discal fovea, the second and third are rather longer than broad and the rest transverse ; the nervellus intercepts at the basal third and the radial is externally slightly curved ; the stigma is a little paler basally and the face parallel-sided.

This species is more slender than *L. bellator*, of which, following Taschenberg, it is considered a variety in Marshall's Catalogue, with the mesonotal punctures larger and sparser and the face and thorax of ♀ immaculate. It is not now considered, as was suggested by Thomson, synonymous with *L. vicina*, Holmgr., from which it differs in the structure and colour of the antennae and its elongate second segment.

It is not a common species in central and southern Europe. If the above variety of Bridgman be indeed referable to this species and not *L. Fletcheri*, which the terebral length renders doubtful, we may consider it confirmed as British on the strength of the single female he brings forward ; later he records this species from Mousehold Heath, near Norwich, though no one else has met with it in Britain and it has not yet been bred.

9. *obsoleta*, Bridg.

*Lissonota obsoleta*. Bridg. Trans. Ent. Soc. 1889, p. 436; Schm. Zool. Jahr. 1900, p. 378; Opusc. Ichn. 1314, ♂ ♀.

Black and somewhat shining. Head transverse, broader than the thorax, narrowed behind eyes; face parallel-sided and very finely punctate; mouth and apex of clypeus rufescent. Antennae of ♂ almost as long as, of ♀ shorter than, the body. Thorax with the mesonotum very finely punctate; mesopleurae somewhat shining and finely punctate; metanotum finely rugose, with areola distinct. Scutellum immaculate. Abdomen with the three basal segments very finely punctate, red with in ♀ a central black fascia, ♂ with the first entirely and second basally black; the remainder smooth and shining; basal segment of ♀ twice, of ♂ more than twice, longer than broad; second quadrate, or in ♂ longer than broad; third of ♂ quadrate, of ♀ subtransverse; terebra as long as the abdomen. Legs red with the coxae and base of the hind trochanters of ♂ black. Wings and stigma pale brown; tegulae pale piceous; areolet pentagonal with the outer nervure obsolete; radial nervure externally slightly curved; nervellus intercepting a little below the centre. Length, 3 mm.

Bridgman says this species is related to *L. linearis* but is much smaller, the second and third segments shorter and the nervellus intercepting nearer the centre. I have seen nothing quite so small as this species, and should suggest from its general debility that it is a starved form of one of the *Segmentator*-group of species, possibly *L. nigridens*, with which it agrees in several important particulars and which has been bred from the same host.

A single example of both sexes was bred in the neighbourhood of Littlehampton by W. H. B. Fletcher from *Psyche intermediella*, as recorded by Bridgman; no one here or abroad has since met with it.

10. *nitida*, Bridg.

*Lissonota nitida*, Bridg. Trans. Ent. Soc. 1886, p. 371; Schm. Zool. Jahr. 1900, p. 367; Opusc. Ichn. 1301, ♀.

Somewhat shining and black. Head transverse and obliquely narrowed behind the eyes; face and frons finely punctate with the interstices reticulate, the latter smooth between the scrobes and finely rugose centrally above them; clypeus apically rounded and pale flavidous. Antennae filiform and not apically attenuate, almost as long as the body. Thorax immaculate; mesonotum finely punctate, with the interstices almost obsoletely reticulate, and notauli wanting; mesopleurae similarly sculptured, with the reticulations more distinct; metathorax somewhat finely and roughly punctate, subimpressed centrally. Scutellum black. Abdomen

with the basal segment about two and a half times longer than apically broad, finely and transversely aciculate with its apical fourth part bright red; second to fourth segments entirely bright red; second a little longer than broad; third a little broader than long, glabrous with obsolete aciculation; terebra about as long as, or slightly longer than, the abdomen. Legs red, with the anterior trochanters infusate and the hind ones black; apices of the hind tibiae and their tarsi subinfusate. Wings with the areolet triangular, narrow and sessile; nervellus opposite and intersecting at the lower fourth. Length,  $6\frac{1}{2}$  mm.

Bridgman says this species is similar to *L. bellator* and *L. varipes*, but is stouter and more glabrous, especially as regards the abdomen, which is differently sculptured.

I possess two ♀♀ which obviously belong to this species, since they agree in every way with the above description of Bridgman, excepting in having the mandibles and palpi also testaceous, and in one all the coxae red while in the other they are nigrescent-badious. The antennae are three-quarters the length of the body, immaculate with their apices obtuse; the mesonotum is dull, closely and confluent punctate; the metathorax scabriculous with obsolete indications of an areola and the basally strong petiolar area much smoother; the basal segment is remarkable:—black, gently arcuate and very finely reticulate to a strong and aciculate transverse impression at its apical third or fourth, whence it becomes deplanate, subglabrous, nitidulous and bright red; the second segment is certainly not broader than long; the terebra is distinctly reflexed; the stigma pale piceous and the recurrent nervure is emitted from the centre of the areolet.

It has probably been mixed, like *L. leucogona*, with *L. bellator* but is easily recognized by its immaculate red tibiae and three central segments, short terebra and entirely black vertex. The sparsely pilose cheeks and sessile areolet will distinguish it from *L. Fletcheri*.

Schmiedeknecht suggests the synonymy of Szepligeti's ♂ *L. vaga* from Hungary with this species.

Only one female bred, without locality, from *Botys asinalis* was known to Bridgman; my two females, mentioned above, were both taken on the flowers of *Angelica sylvestris* in August, one on the 8th in 1901 at Matley Bog in the New Forest and the other at noon on the 29th at Monks' Soham in 1907; it is, however, very probably not uncommon with us.

### 11. *subaciculata*, Bridg.

*Lissonota subaciculata*, Bridg. Trans. Ent. Soc. 1886, p. 372; Schm. Zool. Jahr. 1900, p. 366; Opusc. Ichn. 1300, ♀.

Black. Head transverse and punctate with the interstices finely aciculate, posteriorly obliquely narrowed behind the eyes; clypeus apically



rounded and flavous. Antennae filiform and shorter than the body. Thorax immaculate, punctate with the interstices finely aciculate; notauli wanting; mesopleurae nitidulous, finely and somewhat closely punctate; metathorax transversely rugose and slightly impressed in the centre, laterally punctate, with the petiolar area basally entire. Scutellum black. Abdomen nitidulous; basal segment longer than the hind coxae, apically aciculate, transversely impressed and red; second and third segments longer than broad, obsoletely reticulate, not punctate and entirely red; fourth red with a narrow black fascia before its apex; terebra as long as the body. Legs normal, red; all the coxae and the hind trochanters black, the former apically rufescent; hind tibiae darker than the femora; centre of the hind tarsi ferrugineous; and their claws basally subpectinate. Wings with stigma infusate and somewhat paler basally; radix and tegulae flavous; areolet petiolate and about as long as broad; nervellus intercepting at the lower third. Length, 7 mm.

Bridgman says this species is most closely allied to *L. Fletcheri*, from which it differs in the length of the terebra, distinctly nitidulous second and third segments, and the partly red hind coxae. Its relationship to *L. nitida* is evidently very close, though I have not seen the present species; therefrom it appears to differ, besides its general alutaceousness, in nothing but its longer third segment and terebra, and in the petiolate areolet, for I have shown the coxal colouration of the former to be variable.

The only known specimen is a female sent by W. H. B. Fletcher, who probably took it in Sussex, to Bridgman, in whose collection in the Norwich Castle Museum it probably still is.

## 12. *bellator*, Grav.

*Ichneumon coracinus*, Gmel. S.N. i. 2704 (?). *Lissonota bellator*, Gr. I.E. iii. 106 (part.); Zett. I.L. 384 (part.); Schöff. F.G. cxvii. 12; Holmgr. Sv. Ak. Handl. 1854, p. 93; *lib. cit.* 1860, n. 10, p. 50; Tasch. Zeits. Ges. Nat. 1863, p. 284; Thoms. O.E. 765 et xiii. 1421, ♂ ♀. Var. *L. arvicola*, Gr. I.E. iii. 49, ♂; Rat. Ichn. d. Forst. ii. 98, ♀. Var. *L. lapponica*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 51, ♀.

A slender black species, finely pubescent and a little shining, with the legs and centre of abdomen red. Head closely and finely punctate, somewhat dull with short piceous pilosity; frons narrower than the centrally protuberant face; temples abruptly narrowed behind the eyes; palpi, mandibles, clypeus, and a mark at the vertical orbits flavous, ♂ also with the cheeks, face and usually the frontal orbits pale flavous. Antennae slender, filiform and about as long as the body; of ♀ immaculate or with the extreme apices of the basal flagellar joints rufescent, of ♂ with the scape flavous beneath. Thorax closely finely and evenly punctate, somewhat dull; of ♀ immaculate; of ♂ with marks on the pro-

and meso-sternum, margin of propleurae, a dot on mesopleurae, a line below and an elongate one before the radix, a hamate mark on either side of the mesonotum and rarely the pronotum, flavous; pleurae dull throughout; metathorax of ♀ evenly and very finely and transversely aciculate-punctate, of ♂ scabriculous, with no trace of areae but the petiolar area basally distinct and very rarely a longitudinal impression on the disc. Scutellum immaculate or in ♂ uncommonly (form typ.) flavous. Abdomen somewhat shining and distinctly though very finely reticulate; basal segment of ♂ more than, of ♀ about, twice longer than apically broad with its apex red; second and third red and longer than broad, remainder subglabrous with the fourth basally or mainly and in ♂ the fifth, red, centrally more or less broadly dotted or fasciated with black; terebra as long as the body. Legs red with the hind tarsi infusate; ♀ with the hind or posterior trochanters above alone nigrescent; ♂ with the anterior coxae and trochanters entirely, and the hind ones apically or externally, clear flavous and the hind ones basally or internally quite black. Wings hyaline or a little clouded, of ♀ somewhat small; stigma testaceous, radix and tegulae stramineous; areolet sessile and triangular; radius apically quite straight; nervellus opposite and intercepted at its lower fourth. Length, 7—8 mm.

It is slightly variable in the extent of the flavous markings on head and ♂ thorax; the ♀ vertical dots are rarely obsolete or even wanting, the ♂ hind coxae are occasionally mainly flavous and its scutellum is usually entirely black. The variety *arvicola* is a ♂ with the face, except its orbits, black; no pale marks on the mesopleurae; the scutellum black and the abdomen concolorous with the second segment alone apically testaceous or whitish-fulvous; the legs entirely fulvous; the stigma piceous, and areolet minute and petiolate; length,  $3\frac{1}{2}$  lines ( $7\frac{1}{2}$  mm.). Gravenhorst knew but one example of this form, taken on umbels near Gottingham in the middle of August, and compares it with *L. segmentator*, with which it is said to be similar in conformation, though the legs are shorter and antennae stouter.

This is among the smallest of the red-bodied species of the present genus and easily distinguished, except from *L. argiola* which is much stouter, by the frons being distinctly narrower than the face, the two basal segments very finely scabriculous in ♂ or reticulate in ♀, the terebra as long as the body and the areola totally wanting.

It is a very common kind throughout Europe, but has not been bred on the Continent unless one relies upon Ratzeburg's reference (*loc. cit.*) to the emergence of *L. arvicola* from beech logs containing *Anobii* and *Ptilini*. Both sexes have been bred by West (Proc. S. Lond. Soc. 1896, p. 86) from an unascertained host; Bridgman (Trans. Norf. Soc. 1893, p. 631) records it from *Botrys asinalis* and Buckler, in his Larvae, from *Trochilium*

*tipuliforme*. I have once taken the female at Ningwood, in the Isle of Wight, as early as 26th June and Piffard has found the male at Felden in Herts. on 27th; but in Suffolk it is never seen till the 14th or 20th of July and is not common till August; then it is abundant everywhere on flowers and by sweeping till the middle of September, but does not extend to the end of the month; my latest date is the 25th. The above appears to be all that is known of the economy of this ubiquitous but somewhat uninteresting insect. I suspect it of preying largely on *Crambi*.

I have records from Shere, Plumstead, Felden, Whitby, Greenings, Reigate, New Forest, Newport in I.W., St. Margarets in Kent, Hastings; Matlock (Tomlin); Malvern (Gorham); Crookston (Dalglish); Hunstanton, Nottingham; Scarborough (Elliott), Wharfordale (Porritt), Guisborough in Yorks (Roebuck); Essex, Wimbledon, Norbury; Shirley (Newbury); Copthorn; Dorking (Butler); Carlisle (Routledge); Lands End and St. Issey in Cornwall, Derbyshire; Fairmilehead and Drumshoreland Pond in West Lothian (Evans); Devonshire; Alderney and Guernsey (Luff). My two hundred specimens were mainly taken in Suffolk at Tostock, Ashfield, Bury, Benacre, Southwold, Oulton, Aldeburgh, Marlesford, Claydon, Barnby, Foxhall, Finborough, Tuddenham, Burgh Castle, Henham, Kenton, Monks' Soham, Beccles, Henstead, Herringswell, Barham, Dodnash, Felixstowe, Worlington and Lackford Bridge; though I have also found it at Lyndhurst in Hants, Huntingfield in Kent, Ryde in I.W., Sutton Bridge in Lincs., Chippenham in Cambs., and Metton in Norfolk.

### 13. *argiola*, Grav.

*Lissonota argiola*, Gr. I.E. iii. 83; Holmgr. Sv. Ak. Handl. 1854, p. 93; Schm. Zool. Jahr. 1900, p. 365; Opusc. Ichtn. 1299, ♂. *L. bellator*, var., Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 50, ♂.

Head closely and finely punctate, distinctly narrowed behind the eyes; mouth, face, cheeks, frontal and vertical orbits broadly flavous. Antennae subfiliform and distinctly attenuate apically, a little shorter than the body with the scape flavous beneath; basal flagellar joint half as long again as the second. Thorax black, closely and finely punctate, feebly shining; sternum and mesopleuræ mainly flavous; pronotum anteriorly and posteriorly, a broad and apically explanate line before the radix, two slender and centrally coalescent mesonotal vittæ, broad lines below the radix and generally lateral dots on the rugose metathorax, flavous; petiolar area basally entire. Scutellum flavous and sometimes centrally black. Abdomen basally almost dull and strongly punctate, smoother and more shining towards the anus; black, either with the segments stramineous-margined and the second to fourth also basally stramineous or with the two basal segments black and their apices red; the third to fifth or seventh seg-

ments red with two black dots of variable size and sometimes confluent; basal segment more than twice, and the second a little, longer than broad; third and fourth quadrate. Legs rufescent; coxae and trochanters flavous with the hind ones black marked; hind tarsi infusate. Wings hyaline or subhyaline; radius and stigma piceous or testaceous; radix and tegulae flavous; areolet sessile and irregular, sometimes pentagonal; radial nervure apically inflexed. Length, about 9 mm.

Holmgren compares it with *L. lineata* and says the antennae are shorter and areolet sessile; and Schmiedeknecht, who annually takes a few specimens in Thuringia, remarks that it is very like *L. bellator*, though considerably stouter. No one has yet succeeded in capturing the ♀.

That it has any right to a position in the British list is doubtful, since such must rest solely upon Desvignes' record of it, as distinct from *L. bellator*, in his 1856 Catalogue; in 1863 Taschenberg considered it a mere variety of the latter and was followed in this view by Marshall in both his British Catalogues: I certainly have no extraordinarily stout males among my two hundred specimens of *L. bellator* and no one has recently mentioned it as specifically indigenous.

#### 14. *variipes*, Desv.

*Lampronota variipes*, Desv. Cat. (1856), 81, ♀. *Lissonota commixta*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 50; Thomson, O.E. viii. 766 et xiii. 1421; Schm. Opusc. Ich. 1298, ♂ ♀. *L. opacula*, Szepl. Term. Füz. 1900, p. 34, ♂. *L. alpina*, Strobl. Mit. nat. Ver. Steier. 1901, p. 24, ♂.

Black, punctate, finely pubescent and a little shining. Head narrowed behind the eyes, anteriorly subtriangular; the deplanate frons and face of equal breadth throughout; ♀ with mouth partly ferrugineous and vertical orbits often flavous-marked; ♂ with mouth, cheeks, internal orbits and rarely the face, flavous. Antennae filiform, rather longer in ♀ than half body, not apically attenuate with the apical joints not discreted; scape deeply excised and in ♂ flavous beneath. Thorax narrower than the head, longer than high, punctate and somewhat shining; of ♀ immaculate, of ♂ with flavous markings; metathorax scabriculous with only the petiolar area basally entire; spiracles small and circular. Scutellum immaculate. Abdomen not petiolate, a little longer than the head and thorax, nearly parallel-sided, alutaceous and a little shining; black with the centre more or less broadly red; basal segment scabriculous and dull throughout, curved, somewhat shorter than the hind coxae and trochanters, not canaliculate, slightly impressed transversely before the apex and gradually a little contracted basally; second segment scabriculous and dull, subquadrate in ♀ or longer than broad in ♂, which has the ventral plica flavous; terebra reflexed and nearly as long as the body. Legs slender, red with the trochanters, and in ♂ hind coxae

mainly, nigrescent; ♂ with the anterior coxae and trochanters flavous; claws not pectinate nor double length of the pulvilli. Wings clouded in both sexes; stigma infusate; ♂ tegulae flavous; areolet sessile or shortly petiolate, emitting the recurrent nervure from near its centre. Length, 9—10 mm.

Holmgren's second variety, with coxae mainly black, is certainly synonymous with Desvignes' species, which must consequently be accorded priority; there are two female co-types from his collection in the British Museum, which I have carefully examined. Holmgren also says the ♀ sometimes has the abdomen more or less discally nigrescent or the areolet pentagonal, in the ♂ the face may be entirely black or have the orbits alone partly flavous, the anteradial lines obsolete, or the coxae and base of trochanters black.

It is said to closely resemble *L. bellator*, but to be constantly larger with the frons and face of equal breadth, the two basal segments alutaceous or finely scabrous throughout and not shining, with the former impressed before its apex, and the antennae and wings darker. From all the other species occurring in the palaearctic region, Schmiedeknecht distinguishes it in both sexes by having the abdomen centrally red, the radius straight and the claws hardly longer than the pulvilli; in the ♀ sex by the distinct (not confluent) punctate and dull two basal segments, the legs entirely red with the hind trochanters alone infusate and the terebra as long as the body; and in the ♂ sex by the face being not entirely flavous (though Holmgren gives it as occasionally so coloured), the hind coxae and trochanters black and the anterior flavous.

I must own, however, that I have spent a very long time picking this species from among *L. bellator* and am not sure that I have in every individual entirely succeeded; though the larger specimens and black-faced males are distinct enough in their way, there appears to be no hard and fast line of demarkation, such as one is accustomed to term specific, between them. Or *L. commixta* does not occur in Britain at all and all the following are nothing but unusually strongly punctate, large, dark-winged *L. bellator* with dark-headed males. I have specimens from Tostock (Tuck); Woking (E. Saunders); Reigate, in August, 1872 (W. Saunders); Poyntzpass, in Co. Armagh (Johnson); and have several times taken both sexes in Suffolk at Claydon Bridge, Waldringfield, Barnby Broad, Easton Broad, the Bentley Woods and Southwold, always on the flowers of Angelica and dates ranging only from the 10th to 26th September, though it does not appear to extend with us into October, when it is said to be sometimes abundant in Central Europe; Holmgren says it is not infrequent in Sweden. It is recorded from Norfolk, Devonshire and the Hastings district, but I can find no mention of its having yet been bred.

15. *cylindrator*, Vill.

*Ichneumon cylindrator*, Vill. Linn. Ent. iii. 180, ♂ ♀. *I. clypeator*, Gr. Mem. Ac. Sc. Torin. 1820, p. 372, ♂. *Tryphon clypeator*, Gr. I.E. ii. 131; Ste. Ill. M. vii. 233, ♂. *Lissonota cylindrator*, Gr. I.E. iii. 102; Schöff F.G. cxvi. 22, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 93; *lib. cit.* 1860 n. 10, p. 51; Tasch. Zeits. Ges. Nat. 1863, p. 284; Thoms. O.E. viii. 762 et xiii. 1418, ♂ ♀.

A distinctly nitidulous species, punctate and black with short whitish pubescence and the abdomen more or less indeterminately rufescent. Head densely punctate, somewhat stout and not strongly narrowed behind the eyes; clypeus convex, apically rounded with the basal foveae of the ♀ somewhat conspicuous; palpi infusate or ferrugineous; mandibles lighter or darker ferrugineous, black or rarely flavous with their base and apex black, labrum concolorous; orbits of ♂ sometimes obsoletely flavous near the scrobes, of ♀ sometimes next the frons or externally narrowly flavescent. Antennae somewhat attenuate apically, black, of ♂ as long or nearly as long as the body, of ♀ a little shorter. Thorax densely punctate, subcylindrical and immaculate; mesonotum confluent punctate with obsolete notauli; metathorax evenly punctate, more roughly in ♂, often centrally impressed; petiolar area striate and always basally entire. Scutellum black. Abdomen nitidulous, of ♂ longer and narrower, of ♀ as long and as broad as the head and thorax, subcylindrical, black; the two basal segments obsoletely aciculate and shining, hardly smoother towards their apices; the following nitidulous and obsoletely reticulate; the four basal segments more or less narrowly marked with indeterminate red; first segment nearly twice longer than broad, centrally diffusely punctate, with the two following quadrate and the remainder transverse; terebra longer than the body (body 9, terebra 11, mm.), black with the spicula castaneous. Legs fulvidous and normal, more slender in ♂; coxae and trochanters black, and sometimes castaneous-marked; hind tarsi nigrescent; claws large and double length of the pulvilli. Wings normal and slightly clouded; stigma and radius infusate or substramineous; radix and the ♂ tegulae whitish, latter in ♀ rarely concolorous, usually ferrugineous or testaceous; areolet irregular, petiolate or subpetiolate, emitting the recurrent nervure from beyond its centre. Length, 8—12 mm.

The extent of red colouration upon the central abdominal segments varies from very nearly wanting to segments two to five entirely red, and Gravenhorst mentions a variety with the abdomen pale castaneous and only the anus black. The elongate claws will easily distinguish this from other similarly coloured species; I have found the distinctly paler apical tarsal joint a very good and constant superficial character in both sexes.

It is recorded by Gravenhorst from Netley in Shropshire and is not at all uncommon throughout the Continent, where Brischke has bred it from *Tapinostola elymi* in Prussia and Holmgren took it commonly on umbelliferous flowers in Sweden; the former says the cocoon is cylindrical and dull red-brown. Buckler says it has been raised in Britain from *Trochilium culiciforme*.

In Britain it is very common throughout the months of July and August, being first found in my experience on the second of July on the late flowers of *Chaerophyllum temulum*, later on *Heracleum sphondylium*, in August on those of *Foeniculum vulgare* and finally on *Angelica sylvestris*; in September it is rare and I have but twice found it during that month, the latest observation being on the 14th in the coast salt-marshes, where its emergence may be supposed to be somewhat retarded by its situation. It is, too, often taken by sweeping herbage, oats, bracken, water-weeds and reeds; and I once took the female at artificial light indoors at the end of August; the males have occurred to me at the roots of grass on the sea-cliffs in the same month, though what it mainly preys upon in Britain we do not yet know. All the local lists contain it and it has been recorded from Essex and Hastings (Vict. Hist.); as very common in Norfolk (Bridgman); Bickleigh and Oreston Quarry (Bignell); Lands End (Marquand); and Holgate, in Yorks (Wilson). I have seen specimens from Bulwell Forest, Notts. (Carr); Shotover, near Oxford (Hamm); Edinburgh, Kirknewton and Comiston (Evans); Orton, near Carlisle (Day); and Kings Lynn (Atmore). And possess others from Thornwick Bay, near Flamborough (Elliott); Ravenscar (Bingham); Shere (Capron); Rookley Wilderness, in Isle of Wight (Morey); Giffnock (DalGLISH); Dover (Sladen); Greenings, in Surrey (W. Saunders); Feldon (Piffard); Coulsdon (Bedwell); Norbury and Hunstanton (Brunetti); Brockenhurst (Cross); Whitby and Cosham (Beaumont); Bewdley (W. Ellis); Ashby, Lincs. (Thornley); Bury, Tostock and Bungay (Tuck); West Runton, Norfolk (Wainwright); Dorking (Butler); and Lyndhurst (Adams). In Suffolk, it has occurred to me at Clopton, Ipswich, Tuddenham Fen, Barnby Broad, Reydon, Debenham, Dodnash, Southwold, Henley, Monks' Soham, Henstead, Bramford, Dunwich, Foxhall, East Bridge, Brandon, Marlesford, and Barton Mills. Elsewhere, I have found it at Gedney, in Lincs.; Hunstanton, Ringsfield, Docking and Cromer, in Norfolk; Oxshott in Surrey; Huntingfield and Doddington, in Kent, and Lyndhurst, in Hants.

16. *sulphurifera*, Grav.

*Lissonota sulphurifera*, Gr. I. E. iii. 39; Holmgr. Sv. Ak. Handl. 1860, n, 10, p. 53; Tasch. Zeits. Ges. Nat. 1863, p. 286; Thoms. O. E. viii. 762 et xiii. 1418; Schm. Zool. Jahr. 1900, v. 359, ♂ ♀. *Meniscus caudatus*, ♀ et *M. affinis*, ♂, Szepel. Term. Füz. 1900, p. 37. *L. rimator*, Thoms. O.E. viii. 762 et xiii. 1418, ♂ ♀.

A densely punctate, slightly shining and nearly entirely black species, with red legs. Head only slightly narrowed behind the eyes, with cheeks and temples subbuccate; apex of clypeus, palpi and labrum ferrugineous; ♂ usually with the mouth except apices of mandibles, clypeus, and the facial orbits more or less distinctly, testaceous or sulphureous. Antennae usually immaculate, though in ♂ sometimes ferrugineous beneath. Thorax black, punctate and a little nitidulous, in ♂ with a small flavidous dot at the radix and very often a more or less distinct concolorous line before it; metanotum scabrous, not canaliculate; petiolar area basally entire, not or only laterally striate. Scutellum black. Abdomen either entirely black or with the apical margin of the third segment very narrowly castaneous, of ♂ more slender; basal segment at least twice longer than broad, a little narrowed basally, scabriculous; second and third transversely aciculate and finely punctate, somewhat longer than broad in ♂ or subquadrate in ♀; fourth of ♂ quadrate; terebra longer than the body (body 10, terebra 11, mm.) with the spicula badius. Legs red with the hind tarsi and only the apices of their tibiae always black; coxae and trochanters usually black, ♀ with apices of the latter red, ♂ with both usually though not always red-marked and the anterior flavous beneath; claws red and double length of the pulvilli. Wings normal, somewhat clouded; stigma and radius piceous or rarely testaceous; radix and the ♂ tegulae stramineous, latter in ♀ infusate or flavidous; areolet petiolate or subpetiolate and nearly regular, emitting the recurrent nervure from near its centre. Length, 7—11½ mm.

Not uncommonly all the coxae are red.

This species is said by Gravenhorst to be similar to *L. impressor*; but it is easily known by the entirely or nearly entirely black abdomen, elongate three basal segments of ♂ of which the first is scabriculous and nearly parallel-sided, the terebra longer than the body and the shortly petiolate areolet, which emits the recurrent nervure from a little beyond its centre. The colouration of the ♂ coxae, head and mesopleural hamate marks is very variable in extent and all are rarely wanting. *L. rimator*, Thoms., is no more than a form, which is very common in Britain, of this species, with the mesosternal sulcus more deeply impressed, the ♂ coxae and trochanters pale and no flavescent lines before the radix; but it is not constant.



It is common in central Europe, but becomes rare towards the north; Gravenhorst saw both sexes from Netley in Shropshire. This is one of the latest species in Britain, where it is never seen before the 6th August, on which date I have taken it in the New Forest, though in Suffolk it is not found till the 24th; till the middle of October it is common everywhere and may still be met with as late as the 9th November, when I found a female beneath a cut sod of grass in 1895 (*cf.* E.M.M. 1900, p. 42). It is frequently swept from herbage and reeds, but most of my century and a quarter were taken on flowers of angelica, fennel and wild carrot; one female flew in to artificial light on 23rd August, 1906. I know of no Scotch records, though it is common enough in Sweden. One male and two females have been bred by Adkin (Proc. S. Lond. Soc. 1896, p. 82) from larvae of *Sesia scoliiformis*, Bork., and by South (Buckler's Larvae) from *Triphaena fimbria*, near London; but it must feed, having regard to its great frequency, on much commoner hosts; Brischke has raised it in Prussia from *Hadena suffuruncula* (Schr. Nat. Ges. Danz. 1880, p. 120). New Forest, Lyndhurst, Dover, Deal, Dorking, Shere, Woking (E. Saunders), Greenings, Felden, Hastings, Hollington, Devonshire, Sutton in Surrey, Cardiff, Bewdley, Bristol, Ely, Essex, Cadney in Lincs., South Leverton in Notts., Hunstanton, York, Carlisle, Ballaugh in Isle of Man (Dr. Cassal), Poyntzpass and Acton Glebe in Armagh (Johnston), Harting and Kilmore (Beaumont). In Norfolk, I have found it at Burnham Thorpe, Hunstanton, Ringstead and Metton near Cromer; and in Suffolk at Sproughton, Foxhall, Henham, Ousden, Depden, Claydon, Covehithe, Halesworth, Wattisham, Eye, Kenton, Monks' Soham, Ipswich, Bramford, and Alderton; Tuck has taken it at Finboro' Park, Benacre, Tostock, Bungay, Aldeburgh, Southwold; Bedwell at Oulton Broad; Tomlin at the Bentley Woods and Elliott at Tuddenham Fen in the same county. It was among the last insects ever taken by my friend, the late Mr. A. J. Chitty, at his house (Huntingfield) at Easling, near Faversham, in Kent.

### 17. *femorata*, Holmgr.

*Lissonota femorata*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 55, ♀.

♀. A nitidulous, alutaceously punctate, black species. Head transverse and somewhat short, not at all buccate and distinctly narrowed behind the eyes; frons alutaceously punctate and somewhat impressed, a little narrower than the centrally prominent face; palpi and apex of clypeus ferrugineous. Antennae filiform and not apically attenuate, about as long as the body. Thorax distinctly stout, dull, a little longer than high and coarsely alutaceo-punctate; metathorax subscabriculous with the areola obsolete. Scutellum black. Abdomen subfusiform, black with the apices of the three basal segments castaneous; basal segment nearly

straight, a little longer than the hind coxae, normally elevated, alutaceous, with the postpetiole nearly parallel-sided and longer than broad; second segment very nearly broader than long, alutaceous and obsoletely impressed before its smooth apex; the remainder transverse and becoming smoother towards the anus; terebra as long as the body. Legs red with all the trochanters often partly, the hind tibiae and tarsi entirely, infusate-piceous; hind legs somewhat elongate with their tibiae and femora a little stout. Wings subhyaline; stigma dark stramineous or testaceous, radix pale and tegulae basally infusate; areolet petiolate and emitting the recurrent nervure between its centre and apex; nervellus intercepting very far below the centre. Length, 6—8 mm.

Holmgren says this female is similar to his *L. biguttata*, but with the hind legs longer and obviously stouter. The ♂ has not hitherto been known.

♂. Head not abruptly narrowed behind the eyes, black; vertex rounded, obsoletely punctate and not centrally emarginate posteriorly, with a conspicuous flavous dot at both orbits; frons somewhat convex, dull and impressed above the scrobes; face dull and distinctly punctate, a line on either side of the prominent epistoma, confluent apically with the orbits broadly, flavous; clypeus strongly discreted, convex, nitidulous glabrous and entirely flavous; mandibles stout and, like the palpi, flavous. Antennae (7 mm. in length) longer than the body, not very slender, filiform throughout with the joints cylindrical to apex, immaculate with the two or three basal flagellar joints apically slightly nodulose and nearly thrice longer than broad. Thorax black and somewhat nitidulous with the pronotum, a small line on the propleurae, a dot before and a small line beneath the radix, a large hamate mark on either side of the mesonotum shortly recurring into the obsolete notauli, flavous; mesonotum finely and confluent punctate; mesopleurae and sternum strongly nitidulous, finely and distinctly punctate with the speculum glabrous; metathorax finely coriaceous, becoming longitudinally striate before the longitudinally striate and basally strongly costate petiolar area; areola distinctly and parallelly carinate throughout, spiracles small and circular. Scutellum immaculate, obsoletely punctate and somewhat nitidulous. Abdomen subcylindrical and entirely black with only the ventral plica pale stramineous; basal segment nearly twice longer than broad, finely and longitudinally scabriculous, somewhat strongly bicarinate from the deeply impressed basal fovea to the superficial transverse impression before the centrally raised and nitidulous apical margin; second and third segments very nearly broader than long, alutaceo-punctate and obsoletely impressed before their centrally raised apices; remainder becoming smoother to the anus; ventral valvulae not exerted, truncate, black and pilose. Legs not elongate, red with the anterior coxae and trochanters entirely pale stramine-

eous; hind tibiae and tarsi entirely infusate, and their claws not small. Wings hyaline; stigma testaceous, radius piceous, radix and tegulae stramineous; areolet entire, petiolate and triangular, emitting the recurrent nervure from its apical angle; radial nervure straight; nervellus pellucid and intercepting at the basal fourth. Length, 6 mm.

The colouration of the ♂ would appear similar to that of *L. errabunda*, but the cheeks and frontal orbits are immaculate, the central segments not at all rugose and larger tarsal claws will easily distinguish it. Both sexes are instantly known by their large claws, infusate hind tibiae and the ♀ by its transaciculate and not punctate abdomen.

The female has been found in Sweden and central Europe. It was introduced as British by Bridgman (Trans. Ent. Soc. 1882, p. 163) on the strength of three examples taken by him at Brundall and Earlham, near Norwich; but no one else appears to have noticed it or, rather, it has probably been overlooked and mixed with *L. sulphurifera* var. *ruficovis*, from which the impunctate abdomen, infusate hind tibiae and shorter terebra easily separate it. Mr. Fred. C. Adams takes it commonly in his garden at Lyndhurst in the New Forest, whence Miss Chawner has also kindly sent it to me, from the 1st July to the 23rd August, and it is among his specimens that I received the male (described above and now in my collection) on 1st August, 1907. Dr. Capron has found females at Shere, in Surrey, and Mr. H. J. Charbonnier at Taunton, in August; it has occurred to me not infrequently in greenhouses at Ryde, in the Isle of Wight, in the middle of August and I have also once taken it at Gosfield, in Essex, on 24th of July, 1902. Nothing appears to be yet known respecting its economy.

### 18. *culiciformis*, Grav.

*Lissonota culiciformis*, Gr. I. E. iii. 66; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 60; Tasch. Zeits. Ges. Nat. 1863, p. 282, ♂; Schm. Zool. Jahr. 1900, p. 370, ♂ ♀. *L. lateralis*, Gr. I. E. iii. 73; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 56; Tasch. Zeits. Ges. Nat. 1863, p. 283, ♀; Thoms. O. E. viii. 766 et xiii. 1422, ♂ ♀. *L. pleuralis*, Brisch. Schr. Nat. Ges. Danz. 1880, p. 120, ♀; cf. Habermehl, Jahr. Gymn. Worms, 1904, p. 27. (?) *L. assimilis*, Brisch. Schr. Nat. Ges. Danz. 1882, p. 124, ♂.

♂. A slender insect, somewhat shining, alutaceously punctate and black. Head narrowed behind the eyes; face, mouth, clypeus, cheeks and the internal orbits pale flavous. Antennae subfiliform, though a little attenuate towards their apices, slender, as long as or slightly longer than the body, black and sometimes ferrugineous beneath with the scape always flavescent beneath. Thorax gibbulous; pronotum entirely or partly, sternum, a line before the radix or only two explanate marks on front of the mesonotum, sometimes a line below the radix, two longitudinal vittae

on the mesonotum and marks of variable extent on the metapleuræ, flavidous; metathorax closely and finely punctate with the areola obsolete. Scutellum and usually the postscutellum flavous. Abdomen linear, parallel-sided and sessile, a little longer and often decidedly narrower than the head and thorax; second and third segments subquadrate, closely and alutaceously punctate; basal segment obsoletely canaliculate, not elevated, somewhat longer than the hind coxæ and hardly narrower than the remainder, rarely white-margined; the remaining segments apically and sometimes basally white or stramineous; pygidium with a short black style on either side. Legs somewhat slender, fulvous; anterior coxæ and trochanters pale flavous, the latter sometimes basally black; hind trochanters and coxæ flavidous with the latter often black-marked, their tarsi and sometimes apices of their tibiae nigrescent. Wings a little narrow, hyaline throughout; stigma and radius piceous, radix and tegulae pale flavous; areolet subirregular and shortly petiolate, emitting the recurrent nervure nearly from its centre; nervellus intercepting below the centre.

♀. Somewhat shining, alutaceously punctate, black. Head with the mouth and clypeus fulvo-stramineous; a somewhat large mark on the vertical orbits and another on the cheeks pale flavidous. Antennae filiform and not apically attenuate, curved and rather longer than half the body; flagellum ferrugineous beneath. Thorax cylindrical, laterally red; two mesonotal vittæ and the supracoxal areæ also often obscurely rufescent. Scutellum red or red-marked. Abdomen as long as the head and thorax, a little narrower than the latter, finely alutaceous, sublinear and a little incrassate towards the anus; basal segment longitudinally canaliculate in the centre; second sometimes apically castaneous and, like the third, somewhat broader than long, alutaceous with its apex smooth; terebra nearly as long as the body, with spicula castaneous. Legs slender, fulvidous-red; posterior trochanters black above, and the hind tarsi infusate. Wings normal, hyaline; stigma and radius piceous or stramineous; radix and tegulae whitish; areolet irregularly subpetiolate. Length, ♂ ♀ 5—8 mm.

The ♀ is said to resemble *L. variabilis*, from which it differs, besides its colouration, slightly in its more nitidulous abdomen, more distinctly canaliculate basal and shorter second and third segments.

Both sexes are said by Holmgren to be very rare in Sweden, the ♀ in Gottland and the ♂ only in sandy situations; Gravenhorst only knew females from Sickershausen and Parma, and says the male occurs on umbelliferous flowers in July; Schmiedeknecht considers that this species certainly preys upon wood-boring hosts, since it usually occurs in the vicinity of old houses or upon their window-panes. It was introduced as British by Marshall in his 1870 Catalogus, but I have seen no specimens of this distinct species, nor are there any indigenous records available.

## 19. Halidayi, Holmgr.

*Lissonota Halidayi*, Holmgr.\* Sv. Ak. Handl. 1860, n. 10, p. 59; Schm. Zool. Jahr. 1900, p. 368; Opusc. Ichn. 1302, ♀. *L. formosa*, Bridg. Trans. Ent. Soc. 1887, p. 378, ♀.

♀. Black. Head transverse and obliquely narrowed behind the eyes, mouth, clypeus and the internal orbits to vertex flavous. Antennae shorter than the body. Thorax punctate; prothorax with its back part red and upper part flavous, lines on propleurae concolorous; mesothorax entirely red; meso- more finely punctate than meta-notum; a triangular mark on the shoulders and tubercles flavous; metanotum somewhat distinctly impressed centrally, and metapleurae red. Scutellum red, with its sides flavous. Abdomen with the three basal segments somewhat strongly punctate and apically nitidulous; basal segment about one-third longer than broad, apically castaneous; second and third longer than broad, with their apical margin castaneous; fourth more finely punctate and the third to seventh laterally castaneous and apically whitish; terebra about as long as the thorax and abdomen. Legs red, with the anterior coxae and trochanters flavous; hind trochanters above, posterior tarsi slightly, infusate. Wings subhyaline; stigma pale testaceous; radix and tegulae pale flavidous; areolet subsessile, emitting the recurrent nervure beyond its centre; nervellus intercepting below the centre.

♂. This sex differs very little from the ♀: the cheeks, face except the lateral clypeal foveolae and sometimes two longitudinal lines, scape beneath, most of the mesopleurae and whole of the hind trochanters are also flavous; the scutellum is entirely flavous, with only its extreme apex sometimes rufescent; the anal valvulae are exerted and as long as the apical segment; the antennae are as long as the body, slender and slightly pilose; metanotum is not impressed and bears very small circular and somewhat conspicuous spiracles. Length, 5—6½ mm.

Bridgman says the female of this species is very like *L. variabilis* and *L. culiciformis*, but that it differs, besides its rich colouration, from the former in its distinctly punctate abdomen, rather more coarsely punctate mesonotum and posteriorly less obliquely narrowed head, though the structure of the wings is identical; and from the latter in the somewhat longer second and third adominal segments. There can, I think, remain no doubt concerning the synonymy of these two descriptions of the ♀; *L. formosa* is not said to have the sides of the scutellum nor apices of the apical segments flavous, and in *L. Halidayi* the second and third segments are described as longitudine nonihil latioribus but they are in my specimens quadrate; the colour of the hind knees varies and they are

\* "Celeberrimo et oculatissimo Britanniae Entomologo HALIDAY speciem hanc dedicare ejusque nomine insignire, gratum officium existinavit Holmgren."

sometimes black. Bridgman's description is badly punctuated and led Schmiedeknecht into error respecting the thoracic colouration.

♂ has not hitherto been described.

*L. Halidayi* has hitherto been confined to Sweden, where it is said to be very rare. *L. formosa* was described by Bridgman from a single female bred in 1886 by Porritt from either *Rhodophaea consociella* or *Nephopteryx genistella*, presumably in Yorkshire; it has not been noted on the Continent. Mr. E. R. Bankes bred a single male on 28th July, 1900, from the larva or pupa of *Scoparia lincola*, Curt., collected at Swanage, in Dorset, on the second of that month; and during July, 1904, he bred three females and six males from the cocoons of the same host, taken in the Isle of Purbeck in that county. These, together with four of the cocoons from which they emerged, he has kindly given me; the parasite's cocoon is white or very pale brown and quite transparent, cylindrical,  $7\frac{1}{2}$  mm. long by 2 mm. broad, it occupies the whole interior of the host's cocoon wherein is no trace of a chrysalis, showing that in all probability its larva is finally consumed between the period of constructing its cocoon and assuming the pupal state.

## 20. *variabilis*, Holmgr.

*Lissonota hortorum*, Gr. I.E. iii. 47; Ratz. Ichn. d. Forst. i. 109, ♀ (?). *L. variabilis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 56; Schm. Zool. Jahr. 1900, p. 371, ♂ ♀. *L. fracta*, Tasch. Zeits. Ges. Nat. 1863, p. 285, ♀. *L. biguttata*, Thoms. O.E. viii. 767, ♂ ♀ (*nec* Holmgr.); cf. *lib. cit.* xiii. 1422. Var. *L. lateralis*, Holmgr. Sv. Ak. Handl. 1854, p. 94, ♀ (*nec* Grav.).

A little shining, alutaceously punctate, black, elongate and somewhat slender. Head short and distinctly narrowed behind the eyes; mouth and clypeus flavidous, ♂ also with the cheeks and face concolorous; a dot at the vertical orbits often pale. Antennae porrect, somewhat slender, about as long as the body, and gradually attenuate towards the apex; flagellum ferrugineous, and ♂ scape flavidous, beneath. Thorax longer than high, parallel-sided; ♀ with meso- and meta-pleurae rarely red; elongate lines before the radix rarely pale ferrugineous in ♀, broad and flavidous in ♂; ♂ also with margin of the pronotum often broadly, and a broad transverse line above the sternum, flavidous; mesothorax finely scabriculous; areola hardly indicated. Scutellum of ♀ pale ferrugineous, of ♂ laterally flavidous. Abdomen with the basal segment a little elevated, very smooth, in ♀ curved, slightly and gradually dilated towards the apex, of ♂ longitudinally striate, of ♀ alutaceous with the central canaliculation usually obsolete; apical margin of the four basal segments testaceous, the second and third subquadrate or only slightly longer than broad; terebra as long as the body, reflexed and slender. Legs slender, red with the hind trochanters infuscate above and their tarsi ferrugineous, or in ♂,

together with the apices of hind tibiae, subinfusate; ♂ with the anterior coxae and trochanters flavidous and the latter sometimes infusate above. Wings subhyaline; stigma pale piceous; radix and tegulae stramineous; areolet sessile, subsessile or shortly petiolate and rarely wanting, emitting the recurrent nervure between its centre and apex; nervellus intercepting below the centre. Length, 7 mm.

I find that the areolet of this species is rarely entirely wanting, which renders it liable to be mistaken for a *Lampronota*, until the carinae of the areola be noted; Förster, with his morbid craving for genera, placed these specimens with no areolet in his *Asphragis*. Holmgren mentions a ♂ var. with the scutellum entirely black and a ♀, which he thought Gravenhorst had probably mixed with his *L. lateralis*, with the sternum red. Bridgman's *L. rufomedia* has been erroneously synonymized with this species on the Continent. *L. variabilis* is distinct in its narrow and somewhat dull black body, slender legs and antennae, pale vertical dots, more or less infusate hind trochanters, elongate central segments, and in having the scutellum usually and the pleurae rarely red in the ♀.

This species is sparsely distributed throughout northern and central Europe and is not uncommon in Scandinavia. *L. hortorum* is recorded by Giraud (Ann. Soc. France, 1877, p. 408) from *Retinia resinana* and by Marshall (Ent. Ann. 1874, p. 125) from *Ephestia artemisiella*, Steph. The present species has been bred from *Eudorea angustea* and at Kings Lynn, in Norfolk, by Atmore from *Penthina picana*, Fröl. (Bridgman) and by South from *Hydracca nictitans* (Buckler); captured at Bovisand, in Devonshire, in the middle of August (Bignell); Lands End district (Marquand); Shere in Surrey, several (Capron); Felden in Herts. (Piffard); Abinger Hammer, near Dorking (Butler); New Forest (Miss Chawner). As in Belgium, it occurs with us in August and I have not found it later than the 5th September; I took females on flowers of *Heracleum sphondylium* in the Bentley Woods near Ipswich in 1899, on buckthorn and flowers of *Angelica sylvestris* in the New Forest at Lyndhurst and Matley Bog in 1901 and on the latter at Foxhall in September, 1902. It is by no means a common species with us, at least in the open country.

## 21. *rufomedia*, Bridg.

*Lissonota rufomedia*, Bridg. Trans. Ent. Soc. 1886, p. 371, ♀.

Finely reticulate, black. Head punctate, transverse and obliquely narrowed behind the eyes; face transverse and a little broader than the frons; palpi, clypeus, vertical dots and part of the mandibles of ♀ rufescent, of ♂ flavous as well as the facial orbits. Antennae of ♀ as long as, of ♂ a little longer than, the body. Thorax of ♀ with a mark before the radix, and the propleurae laterally, rufescent; of ♂ with marks on the mesopleurae, before and beneath the radix, flavous; mesonotum and

mesopleurae punctate; metathorax longer than broad, subrugosely punctate, with a slight longitudinal impression and the petiolar area basally strong. Scutellum of ♀ usually transversely red in the centre, of ♂ laterally flavous. Abdomen of ♀ very finely aciculate subtransversely throughout, of ♂ punctate and somewhat dull; apices of the three basal segments narrowly rufescent; basal segment fully twice longer than broad, more slender and proportionately elongate in ♂, subcanaliculate in ♀ only; second and third distinctly longer than broad in both sexes; apical segments of ♀ nitidulous and subglabrous, of ♂ pubescent; terebra as long as the abdomen. Legs slender and red with the anterior trochanters more or less infusate and in ♂, as well as most of the coxae, flavous; hind trochanters black, their tibiae except centrally and tarsi infusate, ♂ hind coxae concolourous and sometimes apically flavescent. Wings with the stigma infusate; tegulae of ♀ piceous, of ♂ flavous; areolet subpentagonal or triangularly petiolate, with the outer nervure sometimes obsolete; nervellus intercepting only just above the lower angle. Length, about 7 mm.

The extent of the ♂ flavidous and ♀ scutellar markings is variable and sometimes nearly obsolete. Bridgman says that it differs from *L. biguttata*, Holmgr., in having the central segments decidedly longer than broad and the hind trochanters quite black; these points he found to be constant in over forty examples of both sexes.

Schmiedeknecht in 1900 synonymized this species with *L. variabilis*, Holmgr., with which, however, Bridgman was quite familiar and the broad discrepancies in the two descriptions leave no room for doubt that they are different. In *L. rufomedia* the cheeks are immaculate and the ♂ facial orbits alone flavous; the scape immaculate beneath; the ♀ propleurae are rufescent and the ♂ pronotum immaculate; the ♀ scutellum is only centrally red; the basal segment not longitudinally striate in the ♂, the central segments are elongate; the hind trochanters are entirely black; the ♀ tegulae piceous and, above all, the terebra is only as long as the abdomen. If, however, one is not inclined to rely upon the terebral length as a constant character, though so many individuals of *L. rufomedia* were bred, it might be regarded as a form of *L. variabilis*, to which its sculpture most certainly very closely allies it.

Mr. W. H. B. Fletcher bred forty specimens of both sexes from *Eudorea murana* at Rannoch, *E. mercurella* at Worthing and *Crambus contaminellus* at Worthing, as recorded (*loc. cit.*) by Bridgman. No one else has met with it; but on 13th August, 1901, I swept a female at Denny Wood, in the New Forest, strongly resembling *L. variabilis* from which it mainly differs in having the terebra no longer than the abdomen and must, I think, be referred to the present species, which Bignell also records from Bickleigh at the end of July and Vinstone, Devon, in the middle of August.



22. *frontalis*, Desv.

*Lampronota frontalis*, Desv. Cat. 78, ♂.\*

A black species with distinctly nitidulous abdomen. Head with the clypeus and palpi testaceous, and the mandibles obscurely fulvescent; face finely and densely punctate with the epistoma a little elevated and the inner orbits narrowly stramineous throughout; vertex finely punctate and pilose. Antennae as long as the body, apically curved, infusate above with the flagellum testaceous beneath and its basal joints apically distinctly nodulose; scape piceous. Thorax with a pale testaceous callosity before the radix; notauli wanting; metathorax rugosely punctate with the areola transstrigose, laterally strong and subparallel; petiolar area short and basally entire; spiracles circular. Scutellum immaculate, punctate and deplanate. Abdomen elongate-fusiform, narrower than the thorax; finely and not very closely punctate, strongly nitidulous; first segment subconstricted basally, and centrally deeply canaliculate to beyond its middle; second segment laterally reflexed; anus subacute with the valvulae exerted; petiolar spiracles very prominent. Legs bright fulvous; hind tibiae and tarsi infusate, the former basally paler; claws finely pilose but not pectinate. Wings normal; stigma and tegulae fulvous, radix testaceous; areolet triangular and petiolate; nervellus opposite and intercepting below the centre. Length, 9—12 mm.

I have taken the above description from the four males, from Desvignes' collection, in the British Museum.

23. *unicincta*, Holmgr.

*Lissonota unicincta*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 56; Thoms. O.E. viii. 767 et xiii. 1422; Schm. Zool. Jahr. 1900, p. 374; Opusc. Ichn. 1309, ♀.

♀. Nitidulous, closely and alutaceously punctate, black. Head behind the eyes narrowed; mouth and clypeus alone dull stramineous. Antennae almost as long as the body. Thorax immaculate with the mesopleurae dull; metathorax not transverse and, like the mesosternum, somewhat coarsely punctate, petiolar areae basally entire. Scutellum black. Abdomen black; basal segment laterally strigose longitudinally, more than twice longer than apically broad, convex with discal transverse impression before the apex; second segment shining and glabrous with the apical margin alone fulvescent and, like the apically closely punctate and immaculate

\* *Lampronota notabilis*, Desv. (Cat. 79, ♂), is the ♀ of some *Tryphon* and I shall hope to treat of it more fully in the next volume of this work; the single specimen in the British Museum, which is the type of *L. notabilis*, is much broken. Bignell, of course erroneously, records it from Devonshire.

third, somewhat longer than broad and transversely obsoletely aciculate; fourth subtransverse; terebra slightly shorter than the body. Legs fulvous; hind ones with tarsi, apices of tibiae and a mark on the trochanters, infusate. Wings hyaline; stigma dull stramineous, radix pale, tegulae infusate; areolet sessile and often pentagonal. Length,  $6\frac{1}{2}$ —8 mm.

This species is said by Thomson to be similar to *L. variabilis* in its size, conformation, strongly punctate and not transverse metathorax, but differs in the paucity of the capital markings, longer basal and nitidulous two basal segments of which the second alone has the apex rufescent, and the nigrescent hind tarsi and apices of their tibiae.

The ♂ has hitherto not been known, or mixed with that of *variabilis*: Head not strongly narrowed behind the eyes, black with vertical dots, the facial orbits more broadly below, the clypeus and a horseshoe-shaped mark above it enclosing the subdeplanate finely pilose epistoma between its apices, palpi and mandibles except apex of latter, flavous. Antennae filiform and not paler below, as long as body. Thorax black and somewhat strongly punctate with a dot before radix and a simple line on either side of mesonotum, flavous; metathorax rugulose with the striate petiolar area basally not very strong. Scutellum immaculate. Abdomen finely pilose, cylindrical, narrower and more nitidulous than thorax; base and the glabrous apex of the distinctly reticulate second segment rufescent; basal segment more than twice longer than broad, distinctly reticulate, not centrally canaliculate nor carinate. Legs not stout, red with the anterior coxae and trochanters whitish; hind trochanters, most of coxae and tarsi infusate. Wings normal, slightly clouded, nervures infusate; radix and tegulae stramineous; areolet triangular, emitting recurrent nervure from centre; nervellus broken at basal third. Length,  $6\frac{1}{2}$  mm.

It is said to be uncommon in central and northern Europe; Roman has given me ♀ from Sweden and I have two specimens taken by Piffard at Felden, in Herts., and by myself at Gosfield, in Essex, on 24th July, 1902. Chapman has bred one female and eight males, together with both sexes of *Limneria* sp. from *Depressaria thapsiella* at Taormina, on the eastern coast of Sicily, in 1905, the cocoons which they themselves constructed within their host's cocoons are lighter or darker brick red, cylindrical and abruptly narrowed equally at both extremities, one of which is entirely removed on the emergence of the parasite. A species which he thought perhaps referable to the present was taken by Bridgman about Norwich at Brundall, Eaton and Earlham. I possess a female taken early in September, 1903, by Dr. Cassal in the Isle of Man, at Ramsey.

## 24. trochanteralis, DT.

*Lissonota trochanterata*, Bridg. Trans. Ent. Soc. 1889, p. 438 (*nec* Holmgr.); Schm. Zool. Jahr. 1900, p. 374, ♀. *L. trochanteralis*, Dalla Torre, Cat. Hym. iii. 504.

Black and somewhat dull. Head transverse and narrow behind the eyes; mandibles and palpi red, clypeus flavous. Antennae as long as the body. Thorax immaculate; mesonotum closely and finely punctate; metathorax somewhat finely and roughly punctate, with no trace of areae, but with the basal costa of the petiolar strong. Scutellum black. Abdomen with the basal segment rather more than twice longer than broad and, like the second, very finely aciculate transversely; second and third longer than broad and narrowly rufescent apically; terebra nearly as long as the body. Legs red with the posterior trochanters black; posterior tarsi and hind tibiae infuscate, the latter centrally subrufescent. Wings with stigma black, its extreme base and the tegulae rufescent; areolet entire; nervellus nearly straight and intercepted at its lower third. Length, just over 10 mm.

This ♀ appears to be extremely closely allied to *L. uncinata*, from which it differs only in such variable points as the colour of the hind tibiae and stigma, its rather larger size and perhaps in the length of the antennae. It would probably be advisable to unite them under the latter name, though one hardly likes to do so without examining the type of *L. trochanterata* in the Norwich Museum.

This species, the last Bridgman ever described, is founded upon a single female captured by Champion near Lincoln.

## 25. deversor, Grav.

*Lissonota deversor*, Gr. I.E. iii. 591; Tasch. Zeits. Ges. Nat. 1863, p. 283; Schm. Zool. Jahr. 1900, p. 386; Opusc. Ichn. 1323, ♂ ♀.

Head closely and somewhat coarsely punctate; vertex broad and hardly narrowed behind the eyes; mouth ferrugineous or flavescent, with the apices of mandibles black; internal orbits usually very narrowly flavescent; ♂ with clypeus and usually two longitudinal facial lines flavescent; ♀ with the face either whitish or entirely black or with two ferrugineous lines. Antennae filiform; of ♂ as long as, of ♀ longer than half, the body with the scape unusually ferrugineous beneath. Thorax gibbous, cylindrical, closely and somewhat coarsely punctate, slightly shining; a line beneath the radix, another or a dot before it, and sometimes in ♀ two mesonotal vittae, pale flavous and often indistinct; mesopleurae subnitidulous; metanotum coarsely punctate with the petiolar areae basally

strong. Scutellum triangular, with its lateral margins more or less distinctly pale flavous. Abdomen of ♂ linear-cylindrical, longer and narrower than the head and thorax with its basal segment obsoletely canaliculate, of ♀ cylindrical, as long as head and thorax and slightly narrower than the latter, apical margin of the two dull and coarsely punctate basal segments and the pygidium laterally castaneous; basal segment convex, half as long again as apically broad and impressed before the apex; second and third subtransverse; terebra a little shorter than the body. Legs somewhat slender, red with the hind ones distinctly stouter; thinner and longer in ♂; front and usually the intermediate coxae and trochanters flavous-marked; hind tarsi dull ferrugineous, the ♀ hind tibiae apically and before the base more or less infusate. Wings normal and somewhat clouded; stigma and radius piceous, radix and tegulae pale stramineous; areolet more or less irregular and petiolate, sometimes sessile and pyramidally pentagonal, emitting the recurrent nervure from near its apical angle. Length, 7—9 mm.

This very distinct species is synonymous with neither *L. irrisoria*, as indicated in Marshall's Catalogue, nor *L. leptogaster*, as was surmised by Bridgman (Trans. Ent. Soc, 1882, p. 163 et 1886, p. 368). The latter is now considered to be *Cryptopimpla calceolata*, Grav. The basally constricted first segment of the ♂ renders it liable to be mistaken for a member of the Tryphonid genus *Mesoleptus*. In the present genus this species is instantly recognised by the laterally pale, or pale-marked, scutellum combined with concolourous humeral hamate lines.

It is not uncommonly found in central Europe, where it was taken in July on umbels and house-windows by Gravenhorst. Bridgman had taken six males of this species in 1882 (*loc. cit.*) though probably not in Norfolk, since he makes no mention of it in his list of the Ichneumonidae of that county in 1893. It does not appear to have again been taken till 1899, when Tuck sent me a single male, found by him at Aldeburgh, in Suffolk, on 21st September. The only female I have seen is a more slender insect than Mr. Tuck's male, it measures  $6\frac{1}{2}$  mm. with a terebra of 7 mm., and flew in to artificial light on the dinner-table of Monks' Soham House at 8.30 p.m., 7th August, 1907.

## 26. *carbonaria*, Holmgr.

*Lissonota carbonaria*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 54, ♀.

Alutaceously punctate, black and a little shining. Head hardly narrowed behind the eyes; frons not impressed nor vertex angularly emarginate; mouth testaceous, cheeks subbuccate with the space between the eyes and the apically testaceous but not tomentose clypeus as broad as the mandibles; face transverse and somewhat broader than the frons, in

the centre longitudinally and subcarinately elevated. Antennae slender and filiform, not apically attenuate and nearly as long as the body. Thorax immaculate; mesonotum deplanate; metathorax finely and alutaceously punctate with the areola obsolete and the petiolar area weakly carinate at its base. Scutellum black. Abdomen utterly black with not even the incisures paler, oblong-ovate or subfusiform, somewhat nitidulous, finely alutaceous; basal segment somewhat broad, a little longer than the hind coxae, hardly curved, centrally elevated, with the distinct discal carinae not extending to its apex; the following segments transverse and finely alutaceous; terebra straight and about as long as the body. Legs red and somewhat slender with the hind femora nearly parallel-sided; hind tarsi alone nigrescent. Wings subhyaline; stigma infusate, radix and tegulae stramineous; areolet sessile and emitting the recurrent nervure between its centre and apex; nervellus intercepting a little below the centre; radial nervure straight. Length, 7 mm.

This species differs from those of the *Segmentator*-group in having the abdomen utterly black, with no trace of paler markings at the incisures, the vertex not posteriorly emarginate and the size rather larger.

Only known from Sweden and Belgium, where it appears to be very rare. Bridgman introduced it as British (Trans. Ent. Soc. 1886, p. 373) on the strength of a specimen bred by Fletcher at Abbots Wood, in Sussex, from the pupa of some *Tortrix*; subsequently he tells us that Fletcher also raised it from *Crambus salinellus* and *C. contaminellus*, probably in the same county; and Atmore from *Retinia turionana* at Kings Lynn, in Norfolk.

## 27. *transversa*, Bridg.

*Lissonota transversa*, Bridg. Trans. Ent. Soc. 1889, p. 438; Schm. Zool. Jahr. 1900, p. 387, ♀; Opusc. Ichn. 1324. ♂ ♀.

Black and somewhat dull. Head transverse, laterally rounded and narrow behind the eyes; face transverse and a little broader than the frons; palpi and clypeus fulvous, mandibles centrally and marks at the frontal orbits flavous, ♂ with sides of face more or less broadly and the cheeks concolorous. Antennae filiform and as long as the body; scape of ♂ flavous-marked beneath. Thorax finely and densely punctate; pronotum, a callosity before the radix and triangular humeral marks, flavous; ♂ also with a line below radix, mesosternum and sometimes metapleural spots concolorous; metathorax longitudinally impressed, petiolar area basally prominent. Scutellum black. Abdomen with the extreme apices of the segments obscurely rufescent, usually paler in ♂; basal segment about half as long again as apically broad, very finely punctate with the interstices finely and transversely aciculate, and a slight

transverse impression before the glabrous apex; second segment similarly sculptured and a little broader than long or in ♂ quadrate; the fourth and following subglabrous; terebra as long as the body. Legs red, with the hind tarsi alone infusate; ♂ with anterior coxae and trochanters stramineous and the hind coxae often infusate or black. Wings flavescent; stigma ferrugineous and tegulae flavous, paler in ♂; areolet entire; nervellus intercepting nearly at the lower angle. Length,  $6\frac{1}{2}$  mm.

One of our commonest British species of the genus. Bridgman described it from a female taken by him at Earlham, near Norwich, in August and adds (*loc. cit.*) that Dr. Capron had also taken it at Shere. These latter five females are now in my collection, together with a sixth taken by Piffard at Felden in Herts. Tuck has given me another, which he captured in Chippenham Fen, in Cambs., on 19th July, 1901, and during the following August I myself met with it several times in Matley Bog and at Lyndhurst, in the New Forest. Schmiedeknecht describes the male, which is very common with us, from Thuringia. Butler took several females about Dorking in August, 1900; and it has occurred to me at Harleston, Bentley Woods, and Marlesford, in Suffolk, towards the end of July on the flowers of *Heracleum*; it first appears in May.

## 28. *varicoxa*, Thoms.

*Lissonota varicoxa*, Thoms. O.E. viii. 768, ♀, et xiii. 1425; Schm. Zool. Jahr. 1900, p. 388; Opusc. Ichn. 1325, ♂ ♀.

Black. Head narrowed behind the eyes; ♂ with mouth, triangular vertical spots, cheeks and face except two longitudinal black lines, stramineous. Antennae filiform. Thorax black, of ♂ with the pronotum and both sexes with humeral marks stramineous; mesosternal sulcus slender with a basal transverse line. Scutellum and abdomen black; the latter with the second and third segments narrowly flavescent at the apex; terebra not shorter than the abdomen. Legs red with the front ones basally stramineous and the hind tarsi, with the apices of their submutic tibiae, black. Wings with the nervellus intercepting below the centre and the radial nervure not apically inflexed. Length, 7 mm.

Thomson thus shortly describes this species, which he says is similar to his *L. carinifrons*, though distinguishable by the colour of the legs, the shorter and narrowly flavous-margined second and third segments. Schmiedeknecht adds that the second segment is transverse and the ♀ face bears two longitudinal red lines.

It has hitherto been only known from Sweden, on the Continent. Biggell captured a specimen, so named by Bridgman, at Longbridge, in south Devonshire, on 27th June (Trans. Devon. Assoc. 1898, p. 503). I

swept a female from bracken in the Wilverley Inclosure, in the New Forest, on 17th June, 1907. The only male I have seen is the specimen provisionally named *Lissonota palpalis*, Thoms. (Trans. Ent. Soc. 1907, p. 33), by me; it was bred by Mr. Pool at Enfield, near London, from the longicorn beetle, *Tetropium Gabrieli* in 1906.

## 29. *segmentator*, Fab.

*Ichneumon segmentator*, Fab. E.S. ii. 163 (*nec* Thunb.). *Pimpla segmentator*, Fab. Piez. 114. *Lissonota segmentator*, Gr. I.E. iii. 52, excll. varr.; Zett. I.L. 384; Holmgr. Sv. Ak. Handl. 1854, p. 93; *lib. cit.* 1860, n. 10, p. 57; Tasch. Zeits. Ges. Nat. 1863, p. 285; Thoms. O.E. viii. 769 et xiii. 1424, ♂ ♀. Var. *nigricoxa*, Strobl. Mit. nat. Ver. Steier. 1901, p. 28, ♂.

Black, somewhat rugosely punctate and a little shining. Head not large, narrowed behind the eyes; mouth and clypeus fulvous or stramineous. Antennae somewhat stout and filiform, with the scape and base of the flagellum rufescent or ferruginous beneath; of ♀ longer than half the body, with the basal flagellar joint half as long again as the second, of ♂ more slender and as long or nearly as long as the body. Thorax gibbulous, cylindrical and immaculate; metathorax strongly and rugulosely punctate. Scutellum black. Abdomen black with the apical margin of the first two, three, or four segments narrowly pale castaneous; abdomen as long and as broad as the head and thorax, subpetiolate fusiform or nearly linear, narrower in ♂; basal segment scabriculous, half as long again as apically broad, transversely impressed before the apex and gradually constricted to the basal fovea; second and third segments subquadrate, the former distinctly constricted basally; terebra a little longer than the abdomen with the spicula castaneous. Legs rufescent and somewhat slender; anterior coxae and trochanters of ♂ usually flavous-marked; ♂ with the hind coxae generally basally infusate, rarely nearly entirely black or red, their tibiae sometimes apically nigrescent and tarsi infusate. Wings normal or a little narrow, slightly clouded; stigma and radius pale fuscous; radix and tegulae stramineous; areolet sessile and obliquely pentagonal, emitting the recurrent nervure beyond its centre. Length, 5—6 mm.

It is said by Gravenhorst to differ from the majority of the species with black abdomen in its more strongly constricted basal segment; and Holmgren considered that it is easily known by the head being hardly as broad as the thorax, its sessile areolet, and scabriculous metathorax and basal segment. It may be considered as the type form of a small group of species—*nigridens*, *errabunda*, *dubia*, etc.—differing in very little but the puncturation of the abdomen and formation of its basal segment and its terebra; in the present, the abdomen is basally constricted, legs red and antennae filiform,

This is not a rare species in northern and central Europe; Holmgren detected the sexes *in cop.* in Sweden and Gravenhorst found it from June to August on umbelliferous flowers, window-panes and *Philadelphus coronarius*. Several other kinds have been much mixed with it in Britain, whence it has long been recorded. Tugwell has bred it from *Trochilium sphegiforme* (Buckler) and a doubtful male was raised (Entom. 1883, p. 67) from *Scardia cloacella*; but in reality it is probably very uncommon here, since I possess but a single female, which I beat from a young birch bush, in the Assington Thicks, in Suffolk, on 16th May, 1902. In all probability all the older records refer to *L. errabunda*, Holmgr., with which Dr. Capron and others have mixed it. It is also recorded from Hastings and (Proc. S. Lond. Soc. 1896, p. 86) as bred from one of the *Psychidae*.

### 30. *distincta*, Bridg.

*Lissonota distincta*, Bridg. Trans. Ent. Soc. 1889, p. 437; Schm. Zool. Jahr 1900, p. 381; Opusc. Ichn. 1318, ♀.

Black and somewhat dull. Head transverse, broader thorax and only slightly narrowed behind the eyes; palpi rufescent, clypeus apically and mandibles centrally flavidous. Antennae shorter than the body. Thorax immaculate and narrower than the head; mesonotum finely punctate; mesopleurae nitidulous, anteriorly and inferiorly punctate; metathorax finely and transversely rugulose, areola obsolete and incomplete, petiolar area basally entire. Scutellum somewhat nitidulous, with fine and sparse puncturation. Abdomen immaculate, black with the basal segments apically nitidulous and subelevated; basal segment about half as long again as apically broad, finely reticulate and slightly impressed transversely before its apex; second and third segments almost transverse and finely punctate, remainder smoother and more shining; terebra as long as the metathorax and abdomen. Legs red, with the posterior tarsi alone infuscate. Wings with the stigma pale piceous; radix and tegulae stramineous; areolet petiolate; radial nervure externally straight; nervellus almost straight and intercepted at its lower fourth. Length, 5—6 mm.

"It appears to be very distinct from any previously-described *Lissonota*; the length of aculeus and black body easily separates it from the others" (Bridg. *l.c.*). To me it appears, on the contrary, extremely closely allied to *L. segmentator* both in sculpture, colour and the terebral length; the head is, however, broader than the thorax, the segments have not their incisures rufescent and the areolet of the wing is petiolate; but the last is a very variable feature in the present genus and if the two were compared, better distinctions would doubtless be forthcoming. In a female, which I have no doubt is referable to this species, the basal segment is distinctly shorter and stouter with the apical angles more rounded and the spiracles



much less prominent, the apical hind tarsal joint is as long as the third, and not about one-third shorter as in *L. segmentator*, the thorax and scutellum are identically sculptured throughout, but the head is distinctly a little broader behind the eyes and the transverse anal nervure of the hind wing distinctly more antefurcal.

This species was bred by Mr. W. H. B. Fletcher at the end of May, from larvae in fungi, from Arundel Park, as recorded by Bridgman; but no one appears to have since detected it either here or on the Continent. The cocoon of the female referred to above is very pale testaceous, 7 mm. in length and nearly two in breadth, subcylindrical but a little narrowed at the anal extremity with the capital entirely and irregularly excised by the emergence of the imago, and so transparent that the cast skins of the parasite's larva and pupa are easily discernable. It was found by Mr. Pool among *Orchesia micans* at Enfield, near London, in July, 1907 and undoubtedly both this and Fletcher's specimen were parasitic upon the heteromerous coleopteron.

### 31. *nigridens*, Thoms.

*Lissonota nigridens*, Thoms. O.E. xiii. 1425; Schm. Opusc. Ichn. 1322, ♂ ♀.

A small black species with the legs red and hind trochanters black. Head narrowed behind the eyes; of ♂ with the weak mandibles and the clypeus black, latter not tomentose. Antennae elongate and slender, centrally subincrassate. Thorax and scutellum immaculate. Abdomen black with incisures pale and the second segment not elongate; ventral plica pale. Legs red with the hind trochanters, and ♂ coxae, black; claws small and not double length of the pulvilli. Radius not apically inflexed. Length, 5—6 mm.

This meagrely described species is said by its author to be similar to *L. segmentator* and, like it, to have the vertex angularly emarginate posteriorly, but the ♀ differs in having the head shorter, the mandibles duller, the antennae subdilated before their apices with the third joint a little longer than the fourth, the second to fourth abdominal segments obviously reticulate and punctate with their apical margins pale, the terebra longer and hind trochanters black; and the ♂ in having the clypeus and mandibles black, the metathorax not rugulose, the mesopleurae nitidulous and more finely alutaceo-punctate, the second to fourth segments more obviously punctate, the anterior coxae darker and the hind ones black.

This species has hitherto been only noticed in Sweden, but I find that it is not uncommon in Britain, where it has been much mixed with *L. segmentator* and *L. errabunda*; I have females taken by Capron about Shere in Surrey, Piffard about Felden in Herts, Beaumont at Blackheath on 3rd

of August, 1897 and I took another on the flowers of *Angelica sylvestris* at Harkstead in Suffolk on the 1st September, 1903. Chapman bred a female and two males from British *Psyche intermediella*, along with a specimen of *Hemiteles areator* which was probably hyperparasitic upon it (*cf.* Ichn. Brit. ii. 133), on 22nd of June, 1899.

### 32. *errabunda*, Holmgr.

*Lissonota errabunda*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 58, ♂ ♀ (*nec* Grav.); Brisch. Schr. Nat. Ges. Danz. 1880, p. 122. *L. punctiventris*, Thoms. O. E. viii. 769 et xiii. 1424, ♂ ♀.

Alutaceously punctate, black and a little shining. Head broader than thorax and narrowed behind the eyes; cheeks subbuccate; mouth and clypeus stramineous, ♂ also with cheeks, facial marks and the internal orbits concolorous. Antennae filiform and slightly attenuate apically, a little shorter than the body; flagellum dull ferrugineous beneath. Thorax narrower than the head, with flavous in ♂ or rufescent in ♀ humeral marks; mesonotum immaculate and mesopleurae closely punctate above; metathorax finely scabriculous with the areola represented by a longitudinal impression. Scutellum black. Abdomen oblong-subfusiform; basal segment curved, very smooth, a little narrowed basally and alutaceously punctate, not longer than the hind coxae, centrally subcanaliculate and transversely impressed before the apex; second and third hardly broader than long and strongly alutaceo-punctate; all the segments apically red-margined; the apical ones becoming gradually smoother to the anus; terebra straight or slightly reflexed, and about as long as the body. Legs normal, red with the hind tarsi ferrugineous and the anterior coxae and trochanters of the ♂ pale. Wings slightly clouded; stigma pale infusate, radix and tegulae pale stramineous; areolet sessile and emitting the recurrent nervure beyond its centre; nervellus intercepting below the centre. Length, 5—6 mm.

Holmgren gives a ♀ variety with two testaceous facial marks and a pale dot at the vertical orbits, and a ♂ with the hind coxae partly piceous; he adds that this species may at once be distinguished from *L. segmentator*, with which it had formerly been co-mingled, by the puncturation and markings of the abdomen; as well, says Thomson, as by the stronger abdominal puncturation, more slender flagellum of which the basal joint is hardly longer than the second. With *L. carinifrons*, Thoms., it agrees in its immaculate mesonotum and superiorly very closely punctate mesopleurae, but differs from it in its more strongly punctate metathorax, etc. Schmiedeknecht considers that *L. punctiventris* is not synonymous with the present species on account of some disparity in the length of the terebra and central segments; he may be correct, but Thomson expressly super-

seded Holmgren's name because *L. (Cryptopimpla) errabunda*, Grav. was previously described, and in no way to erect a new species.

This species may be known by its small size, gently curved basal segment which is not or very indistinctly canaliculate, its red hind coxae and trochanters, short and almost parallel-sided basal segment, elongate terebra and pale ♂ face.

It is much the commonest of the *Segmentator*-group in Britain, though not introduced till 1884, when Bennett found it about Guestling, near Hastings (Trans. Ent. Soc. 1884, p. 433.) I possess females taken at Whitby in the middle of August by Beaumont, Felden in Herts by Piffard, Shere in Surrey by Capron, Lyndhurst in the middle of August by Adams, the New Forest by Miss Chawner; and have myself taken both sexes in the middle of August in my father's greenhouse at Ryde in the Isle of Wight, males at Oxshott in the middle of July on *Heracleum* flowers and one female as late as 27th September, 1902, on ragwort flowers in the Bentley Woods, near Ipswich. Bridgman records it from Brundall, near Norwich.

### 33. *dubia*, Holmgr.

*Lissonota dubia*, Holmgr. Sv. Ak. Handl. 1854, p. 94, ♂; Holmgr. *lib. cit.* 1860, n. 10, p. 58; Thoms. O.E. viii. 770 et xiii. 1424, ♂ ♀.

Punctate, black and a little shining. Head finely rugose and dull, hardly narrowed behind the eyes, vertex obtuse; mouth and clypeus flavescent; a dot at the vertical orbits stramineous, ♂ also with cheeks and face for the most part concolorous. Antennae immaculate and normal. Thorax finely rugulose and dull; a humeral mark stramineous, except sometimes in ♀; ♂ with a small line beneath the radix also pale stramineous; pleurae punctate and the longitudinal costae of the areola sometimes fine and in part evanescent. Scutellum black. Abdomen with the basal segment of ♀ a little longer than the hind coxae; three basal segments alutaceously punctate; second to fourth of ♂ apically and in ♀ sometimes testaceous-margined; terebra as long as the body. Legs rufescent with the hind tarsi and in ♂ apices of their tibiae, their coxae above or nearly entirely and the anterior coxae of ♀ in part, nigrescent; ♂ with the anterior coxae and trochanters entirely stramineous. Wings subhyaline; stigma fuscous, tegulae stramineous; areolet sessile; nervellus intercepting below the centre. Length, 4—5 mm.

Holmgren mentions a ♂ variety with all the coxae rufescent and the areolet incomplete; he says it is among the smallest species of this genus

and easily known by the posteriorly broad head, more obtuse vertex, sessile areolet and the colouration of the ♂ face and legs. From the other indigenous species of the *Segmentator*-group, this may be known by its black hind coxae, deplanate and hardly curved basal segment, which is very little narrowed towards the thorax, the terebra as long as the whole body and the flavous-marked ♂ face.

It is said not to be uncommon in central Europe and to also occur in the north. It was first recorded from Britain, with no note of its novelty with us, by Bridgman in his list of Norfolk Ichneumonidae (Trans. Norf. Soc. 1893, p. 631) on the strength of a doubtful example captured by Atmore about Kings Lynn, in that county. This I am now able to supplement by recording two females, taken by Capron at Shere in Surrey and by myself by sweeping reeds by the Little Ouse, at Brandon, in Suffolk, on 11th August, 1906.

### MENISCUS, *Schiödt*.

Schiöd. Guér. Mag. Zool. 1839, Ins., p. 10, note.

Head transverse but not very strongly narrowed posteriorly; clypeus discreted, apically rounded and not depressed; frons normal or excavate or sulcate. Antennae filiform and entire, not very slender nor apically attenuate, with the apical joint elongate and the preceding not discreted. Thorax often pale-marked, notauli obsolete; metathorax evenly punctate or coarsely rugose; base of petiolar area always, and the basal area sometimes, strong; areola never complete; spiracles oblong or circular. Scutellum sometimes convex. Abdomen subsessile and usually immaculate black with apices of segments nitidulous; basal segment not arcuate, longer than broad; hypopygium exerted and concealing base of the usually elongate terebra; spicula incised above before its apex. Legs normal or somewhat elongate with tarsal claws internally pectinate or (*Alloplasta*) setiferous. Areolet distinct and nearly always entire, emitting recurrent nervure from near its centre; nervellus curved and intercepting below the centre.

This genus contains the largest species of Gravenhorst's *Lissonota* and is known therefrom by their large and stout bodies, but especially by the serrate tarsal claws; in all other respects they are extremely similar to such *Lissonotae* as *L. femorata* and *L. sulphurifera*. The last two species unquestionably belong to a distinct genus as is testified both by their conformation and habits, for they prey upon *Noctuae* whereas all the others are parasitic upon lignivorous larvae; *Alloplasta*, however, must, I think, be redescribed before it can be adopted.

## Table of Species.

- |       |     |  |                             |
|-------|-----|--|-----------------------------|
| (12). | 1.  | Tarsal claws closely and strongly pectinate; legs not white-marked.  |                             |
| (3).  | 2.  | Size large, 16—20 mm.  | 1. SETOSUS, <i>Fourc.</i>   |
| (2).  | 3.  | Size smaller, at most 13 mm.   |                             |
| (5).  | 4.  | Frons deeply excavate and frontal orbits elevated                    | 2. CATENATOR, <i>Panz.</i>  |
| (4).  | 5.  | Frons normal.  |                             |
| (7).  | 6.  | Basal segments sparsely and finely punctate, nitidulous              | 3. AGNATUS, <i>Grav.</i>    |
| (6).  | 7.  | Basal segments closely punctate and somewhat dull.                   |                             |
| (11). | 8.  | Second segment quadrate; terebra not longer than body.               |                             |
| (10). | 9.  | Stouter; hind tibiae red; terebra as long as body                    | 4. SULCATOR, <i>Morl.</i>   |
| (9).  | 10. | Slenderer; hind tibiae black; terebra shorter than body              | 5. PIMPLATOR, <i>Zett.</i>  |
| (8).  | 11. | Second segment elongate; terebra longer than body                    | 6. IMPRESSOR, <i>Grav.</i>  |
| (1).  | 12. | Tarsal claws finely setiferous; tibiae basally and hind tarsi white. |                             |
| (14). | 13. | Abdomen strongly nitidulous and mainly red                           | 7. MURINUS, <i>Grav.</i>    |
| (13). | 14. | Abdomen dull and entirely black                                      | 8. PLANTARIUS, <i>Grav.</i> |

1. setosus, *Fourc.*

*Ichneumon setosus*, Fourc. E. P. ii. 395. *Lissonota setosa*, Gr. I. E. iii. 35, ♂ ♀; Ratz. Ichn. d. Forst. i. 109, pl. vi, fig. 7, ♀. *Lampronota setosa*, Curt. B. E. 407. *Meniscus setosus*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 61; Tasch. Zeits. Ges. Nat. 1863, p. 188; Schm. Opusc. Ichn. 1272, ♂ ♀; Voll. Pinac. pl. xiv, fig. 5, ♀. Var. *Lampronota fulvipes*, Desv. Cat. 78, ♂ ♀.

A very large and entirely black species, with red legs. Head densely punctate; mouth sometimes dull ferrugineous; clypeus discreted, convex and apically subtruncate, mandibles arcuate with two equal teeth; frons slightly excavate. Antennae subfiliform and apically a little attenuate, longer than half the body and in ♂ nearly as long as the body. Thorax gibbulous and immaculate, densely punctate with the mesonotum basally smoother and strongly nitidulous; metathorax very coarsely rugose, centrally subcanaliculate with the basal area sometimes entire and the petiolar basally indistinct; spiracles oblong. Scutellum somewhat convex, distinctly punctate and black. Abdomen black, a little longer and in ♂ narrower than the head and thorax, distinctly punctate with the two or three basal segments dull and scabrous with their apices nitidulous and subelevated; the basal segment half as long again as broad, deeply sulcate; second and third quadrate and the third occasionally badious; hypopygium apically incised; ♂ valvulae elongately exerted and large; terebra as long as body, black with the spicula castaneous. Legs fulvous with the coxae black and hind tarsi infusate; claws strongly serrate. Wings normal

and a little clouded; stigma and radius infusate, radix and tegulae nigrescent; areolet large, sessile or subpetiolate and nearly regularly triangular; nervellus intercepting slightly below the centre. Length, 18—20 mm.

This is the largest and stoutest species of the genus; it is very like *M. piminator* but is larger with the frons more impressed, mesonotum more nitidulous basally, metathorax much more strongly rugose and the coxae black. The ♂ is rarer and more slender than the ♀ and not pale-marked.

Bouché says (Naturg. 144) the larva has only the vertex of the dorsal abdominal segments a little gibbous “der Rücken der Abschnitte ist etwas bucklig.”

It is distributed throughout northern and central Europe where it occurs in May, June and August on oak trunks and umbelliferous flowers; in Belgium it is not infrequent in the latter month on old fallows. Gravenhorst records it from Netley in Shropshire, Bridgman from Sparham in Norfolk and Harwood from Essex; Bairstow mentions it as doubtfully occurring in Yorkshire (Trans. Yorks. Un. 1880, p. 108). I possess an ancient female, labelled “Bury St. Edmunds,” from Dr. Wratislaw’s collection\* and have seen another bred by Beaumont at Blackheath from an apple stump, probably from *Sesia myopaeformis*, early in July, 1898. Several of both sexes were sent to me from Bloxworth in Cambs., where they had been bred from a species of *Sesia* (probably *S. bembeciformis*) in osier stumps on 29th July, 1902. Bouché (Naturg. 145) says that this species is parasitic upon the larvae of *Cossus ligniperda*, that it passes the winter in the host’s cocoon and emerges in May, two or three specimens being generally bred from a single host. This statement appears to have been simply copied by Holmgren and subsequent authors (though Fitch and Brischke, who describes the cocoon as brown and cylindrical, appear to have bred it from the same host) till it has given rise to the supposition that *M. setosus* was especially attached to that host, which the above breedings will disprove, though all were from lignivorous lepidoptera. A final instance and a very interesting one is brought forward by Chapman, upon Bignell’s authority (E. M. M. 1898, p. 5): He noticed at Sterzing in the Tyrol that an entomophagous larva of this species constrained its host to spin a cocoon when only in its second year of growth, which is a proceeding it naturally undertakes only just before pupating in the spring at the end of its third year. Only a single specimen emerged: perhaps if more than one had been present the host would have lived its

\* This collection amassed about 1865 and composed, I believe entirely, of Suffolk insects found its way at Wratislaw’s death into the hands of J. B. Hodgkinson and I have seen a memorandum of his acquisition which passed, with at least the Ichneumonidae, to my friend the late Alfred Beaumont. When the latter died while working at insects in his study in Feb. 1905, the Ichneumonidae were bought by A. J. Chitty, whose widow has just (Feb. 1908) presented the whole of his extensive collections to the Hope Dept. of the Oxford University Museum, where they will find a permanent abode.

normal length of days, since the parasites would have had a less plentiful supply of food, through its greater distribution, and consequently have taken longer to become full-fed. The cocoon of the parasite had emerged from the destroyed larva after the latter had spun up, which unnaturally early act was presumably induced by a feeling of weak and premature maturity, perhaps generated by the extent of that to which the parasite within it had attained.

VAR. PIFFARDI. In 1899, Mr. Albert Piffard gave me from Felden, near Boxmoor, in Herts. two females, which are probably specifically distinct from *M. setosus*, and if so are certainly undescribed, though agreeing therewith in their essential characters. Therefrom they differ in having the wings entirely hyaline, the areolet much smaller, the fenestrae discreted by a corneous dot, the mesonotum and scutellum much more closely punctate and duller, the metanotum more evenly punctate and shining; all the coxae, tegulae, radices and the hind tarsi red; and with a total length of only 16 mm. In all other respects they are entirely typical.

VAR. FULVIPES, Desv. A somewhat stout, black species with red legs. Head narrower than the thorax, strongly transverse and slightly narrowed behind the eyes; whole of clypeus, mandibles, and all the palpi bright castaneous; face evenly and feebly punctate, and centrally subelevated, laterally impressed on either side; frons evenly punctate and centrally subconcave; ♂ with the facial orbits obsoletely and narrowly rufescent. Antennae filiform, nearly as long as body, apically obtuse with the apical joints hardly discreted; scape of ♂ dull ferrugineous beneath and slender; flagellum of ♀ as long as the abdomen. Thorax with a fulvous callosity before the radix and notauli very distinct; metathorax somewhat evenly and not strongly punctate; areola obsolete, apophyses indicated but strongly obtuse; petiolar area basally entire; spiracles circular. Scutellum prominent, black and triangular. Abdomen of ♂ nearly, of ♀ quite, as broad as the thorax, discally deplanate; three basal segments dull, confluent, very closely and finely punctate with their apices glabrous, two latter with a broad and subobsolete tubercle on either side, with the spiracles marginal and near the base; remainder smooth and shining, with the apex of the basal segment sometimes subrufescent; terebra as long as the body with the spicula rufescent. Legs red throughout or with the hind tarsi and tibiae subinfusate and the latter somewhat fulvescent towards their base; tarsal claws shortly but distinctly pectinate. Wings with the radix and tegulae ferrugineous, and the stigma piceous; areolet triangular and subpetiolate; nervellus opposite and intercepting distinctly below the centre. Length, 7—8 lines.

The above description is taken from Desvignes' types of *I. fulvipes*, which is undoubtedly synonymous with this species and of which the

♂ has the abdomen apically acuminate with the valvulae distinctly exerted; his description, however, is faulty, especially as regards the length of the terebra, and does not coincide with the types, which I have examined.

The typical ♀ of Desvignes' *L. fulvipes* is in the British Museum with two more ♀ and three ♂ and was bred "from *T. Bembeciformis*."

## 2. *catenator*, Panz.

*Ichneumon catenator*, Panz. Schaef. Ic. pl. xx, fig. 10. *I. lineolaris*, Gmel. S. N. i. 2701. *Lissonota catenator*, Gr. I. E. iii. 45; Ratz. Ichn. d. Forst. iii. 197, ♀. *Meniscus catenator*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 61; Tasch. Zeits. Ges. Nat. 1863, p. 288; Schm. Opusc. Ichn. 1273, ♂ ♀. Voll. Pinac. pl. xiv. f. 6, ♀. *Ephialtes facialis*, Desv. Trans. Ent. Soc. 1862, p. 226, ♂. *Tryphon excavator*, Zett. I. L. 384, ♀.

Finely rugose and dull, with whitish pubescence. Head transverse and somewhat narrowed behind the eyes; frons excavate, with the orbits elevated; vertex deeply impressed centrally; mouth except apices of mandibles, orbits narrowly and usually vertical dots flavous, ♂ with the cheeks and whole face also concolorous. Antennae filiform, longer than half the body and usually dull ferrugineous beneath towards their apices; ♂ with the scape stramineous beneath. Thorax gibbulous and sericeous; black, with a line on either side of the mesonotum and a callosity beneath the radix flavous; sometimes a mark before the radix and a lateral dot above the intermediate coxae red; ♂ also with the pro- and more or less of the meso-sternum flavous; metathorax not centrally sulcate, petiolar area basally distinct, spiracles circular. Scutellum immaculate. Abdomen black and subpubescent, a little longer than the head and thorax, subcylindrical in both sexes, with the basal segments dull and finely scabriculous; basal segment foveolate; following apically a little elevated and subglabrous; second and third rarely laterally or discally badius, the former longer than broad; terebra as long as the abdomen only, with its valvulae very stout. Legs red and somewhat slender, with the anterior coxae and trochanters partly in ♀ and entirely in ♂ flavous; hind trochanters often more or less infuscate, their tibiae externally and tarsi nigrescent; tarsal claws of ♀ somewhat indistinctly pectinate, of ♂ internally setose. Wings hyaline or a little clouded; stigma ferrugineous or testaceous, radix and tegulae flavescent; areolet irregular, petiolate or subpetiolate. Length, 11—12 mm.

[*EPHIALTES FACIALIS*, Desv. Tr. Ent. Soc. 1862, p. 226, ♂.

Head with the whole face and mouth flavous; face dully granulate and somewhat flat; clypeus convex, discreted, more shining, with its apex broadly rounded; mandibular teeth infuscate and subequal in length; cheeks normal and flavescent. Antennae three-quarters the length of the



body; scape entirely flavous beneath; flagellum basally pitchy, but becoming gradually paler towards the apex, which is nearly ferrugineous. Thorax gibbo-cylindrical; elongate callosities before the radix, the region of the wanting sternaui triangularly, the whole of the pro- and extreme apex of the meso-sternum, bright flavous. Scutellum immaculate. Abdomen cylindrical, with the five basal segments elongate and the sixth quadrate; the second to the fifth apically glabrous and subelevated; ventral fold distinct and extending to the fifth segment. Legs fulvous; all the coxae and trochanters flavous, the hind pair fulvous above; the hind trochanters above and the tarsi infusate. Wings slightly flavescent; the radix and tegulae stramineous, stigma testaceous; areolet sessile, nervellus subopposite and intercepted below the centre. Length, 11 mm.

The entire clypeus at once precludes its insertion in the genus *Ephialtes*.

There are three broken male "specimens taken by F. Walker, Esq.," from Desvignes' collection in the British Museum, which I have examined.]

This species is recognised with the greatest facility by the peculiar conformation of the frons and occiput, which are both very deeply excavate, rendering the vertex centrally narrow and subcariniform; the frontal excavation runs semicircularly from behind the apical ocellus to level with the scrobes, and is glabrous and substrate, with the frontal orbits elevated above the eyes. Schmiedeknecht says that *M. sclosus* is similarly conformed but this is not the case, the frons in that species being simply a little impressed.

It is not uncommon on the Continent in woods from May to July; and Gravenhorst says that Hope found it at Netley in Shropshire. As to its hosts, nothing reliable is known; Ratzeburg (Ichn. d. Forst. iii. 107) says that a ♀, somewhat doubtfully referred to this species, was bred from an unknown coleopterous larva, which he supposed to be that of some *Buprestis*, in rotten lime wood (*cf.* also Trans. Ent. Soc. 1907, p. 15). Brischke, on the contrary, mentions having bred it from some *Noctua* larva and describes its cocoon as pale brown, elliptical and shining. It is not rare in England and Scotland, though no one has recorded or bred it. I possess females taken at Lidford, in Devon, on 1st July, 1892 by Marshall; Shere in Surrey by Capron; Treipmuir in Midlothian on 18th August, 1904, by Evans; Dundgwald and Barr in Ayrshire in July, 1900 by DalGLISH; and Bonhill by Malloch. The males appear to be rarer and I have only three, from Cadder in the middle of July by DalGLISH; Nethy Bridge at the end of July, 1904, by Col. Yerbury; and Felden by Piffard. I have taken the female in Suffolk, by sweeping long rank herbage in Barnby Broad, on 5th July, 1906. Marshall instances it (Entom. 1872-3, p. 432) as having been captured by Francis Walker in 1869 in the Isle of Man.

### 3. *agnatus*, Grav.

*Lissonota agnata*, Gr. I. E. iii. 44; Holmgr. Sv. Ak. Handl. 1854, p. 92, ♀. *Meniscus agnatus*, Holmgr. lib. cit. 1860, n. 10, p. 61; Voll. Pinac. pl. xiv, fig. 8, ♀; Tasch. Zeits. Ges. Nat. 1863, p. 288; Schm. Opusc. Ichn. 1273, ♂ ♀.

A black species with red legs and strongly nitidulous abdomen. Head densely punctate; frons somewhat coarsely punctate throughout and only slightly impressed; palpi and clypeus ferrugineous; a dot at the vertical and usually the facial orbits narrowly flavidous. Antennae normal and immaculate. Thorax densely punctate and somewhat shining with grey pubescence and a flavous line on either side of the mesonotum in both sexes; metathorax scabriculously and somewhat finely punctate, the areola indicated and parallel-sided with its apex distinct. Scutellum immaculate. Abdomen black and distinctly nitidulous throughout, subcylindrical in both sexes and narrowed basally from the apex of the second segment; first segment elongately foveate and nearly smooth, second nitidulous and subglabrous; second and third sometimes with their apices, or lateral or discal marks, badius and in ♂ a little longer than broad; terebra a little longer than the abdomen (abdomen 6, terebra 7, mm.), black with the spicula red. Legs red with sometimes the ♀ coxae black-marked; ♂ with the hind coxae mainly, the anterior basally and the hind trochanters partly, black; extreme base of hind tibiae subflavescent; hind tarsi ferrugineous; tarsal claws sparsely pectinate. Wings hyaline with the stigma and radius dull stramineous, the tegulae and radix flavidous; areolet irregular, sessile or subpetiolate. Length, 11—13 mm.

This species is very like *M. catenator* in size and outline, but the frons is only normally impressed and the abdomen is very much smoother basally; the very finely and sparsely punctate, strongly nitidulous second segment will distinguish it from all its congeners.

It is sparsely distributed through the north and centre of Europe, Belgium, Sweden, Saxony, Thuringia, Prussia, etc.; but has not been there bred, though Gravenhorst notices its capture on *Pinus sylvestris* and Voltenhoven says it "seems to live in a caterpillar subsisting on down plants." Buckler, however, tell us that it has been raised in Britain by Wellman from *Trochilium tipuliforme* and Bridgman records it from Earlhain, near Norwich. It is certainly uncommon with us and I have only a pair from Felden, taken by Piffard, and a female from Shere by Capron.

### 4. *sulcator*, sp.n.

(?) *Lissonota impressor*, Grav. (part).

Head evenly punctate throughout; frons not at all impressed, but unisulcate from the apical ocellus to between the scrobes; both sexes with the mouth and clypeus, but not the mandibles, testaceous; ♂ also with the

facial, and sometimes a dot at the frontal, orbits flavous. Antennae of ♂ entirely red at least beneath and exactly as long as, of ♀ three-quarters the length of, the body. Thorax stout and immaculate in both sexes; notauli obsolete and very broad; metanotum confluent and rugulosely punctate to its base; areola basally distinct and parallel-sided; petiolar area basally entire and very strong; spiracles somewhat small and quite circular. Scutellum black and distinctly punctate. Abdomen black, stout and nitidulous, laterally a little rounded in both sexes, finely and distinctly punctate and not reticulate throughout, smoother apically; basal segment hardly twice longer than apically broad, strongly canaliculate to near the centrally subglabrous apex, laterally coarsely striate towards the base, just before which on either side it is abruptly constricted; second and third segments quadrate, the following transverse; terebra exactly as long as the body. Legs not elongate, red with the hind tarsi and their straight tibiae entirely nigrescent; ♂ coxae not paler; tarsal claws sparsely but distinctly pectinate. Wings normal, hardly clouded; stigma and tegulae piceous; areolet distinctly petiolate and in ♂ rarely entirely wanting, emitting the recurrent nervure from its centre; nervellus curved and intercepting the subopposite anal nervure only slightly below its centre. Length, 8—11½ mm.

The type is in my own collection.

Gravenhorst describes the terebra of *M. impressor* as of the same length or longer than the body; Schmiedeknecht has given it as of 15 mm. to the 12 mm. body; and correctly assigned it a black-faced ♂. Consequently the former almost certainly mixed two species under this name and the latter has taken that with the longer terebra as representing it. I believe the species here described to be the other form of Gravenhorst's description hitherto looked upon in Britain as the more typical one. It is altogether a stouter insect than that with the longer terebra and second segment longer than broad, and the colour of the ♂ face is distinct, as also in both sexes is the frontal sulcus, from all the others of the genus, though doubtless not dissimilar from *M. canaliculatus*, Szep., which has the terebra shorter, tegulae flavous, etc. One of my males has, like *L. defectiva*, Gr., the areolet entirely wanting.

This species is that recorded in Britain under the name *M. impressor*, as noted under the latter, from Essex by Harwood, as common in Norfolk by Bridgman and occurring at Bickleigh and Marsh Mills in Devon in August and September by Bignell. It has, however, not been bred hitherto. On 10th June, 1903, Duncan bred two males and two females from *Sesia culiciformis* in the Bromar District; and on 9th and 18th of July, 1902, Thornhill kindly sent me three males and six females bred by him at Bloxworth in Cambs, from (probably *Sesia bembeciformis* in) osier stumps. I also possess a female captured by Beaumont at Plumstead at the end of

September. It is very improbable that the specimen of this species, recorded (Entom. 1884, p. 71) from *Luperina testacea*, was correctly named.

### 5. *pimplator*. Zett.

*Lissonota bilineata*, Gr. I.E. iii. 41, ♂ (?). *L. impressor*, var. 1 (*nec* 2), Gr. lib. cit. 51, ♀. *Tryphon pimplator*, Zett. I.L. 384, ♀. *Meniscus pimplator*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 62, ♀; Voll. Pinac. xiv, fig. 7, ♀; Tasch. Zeits. Ges. Nat. 1863, p. 288; Schm. Opusc. Ichn. 1274, ♂ ♀.

Somewhat compressed and closely punctate throughout with the second segment quadrate and closely punctate. Head with the frons not at all impressed; ♀ orbits immaculate; palpi and clypeus testaceous or in ♂, as well as mandibular spots, flavous. Antennae in both sexes shorter than the body. Thorax of ♀ immaculate; of ♂ with a triangular spot on either side of the mesonotum, a line before and another beneath the radix, flavous; metathorax distinctly and rugosely punctate. Scutellum black and sometimes laterally flavous. Abdomen black and subcylindrical with the three basal segments weakly impressed transversely before their apices; first segment only basally excavate; second transverse and densely punctate; terebra rather longer than the abdomen (abdomen 6, terebra  $7\frac{1}{2}$ , mm.). Legs red with the coxae black or (var. *impressor*, Zett.) red; hind tarsi and sometimes their tibiae infusate. Wings slightly clouded; tegulae testaceous, stigma piceous; areolet shortly petiolate. Length, 9—12 mm.

In my ♂♂, bred along with the ♀♀, the whole face except a black dot beneath each scrobe, the genal orbits, the scape beneath, prosternum apically, mesosternum transversely in the centre, anterior coxae and trochanters entirely, hind trochanterellus and the extreme base of the posterior tibiae are stramineous, the flagellum entirely testaceous beneath and the scutellum immaculate; in fact, its colouration is very like that of *M. catenator*, but with the frons entire.

This species is like *M. catenator*, but the frons is not impressed and the terebra is longer and more slender; the densely punctate basal segments and ♀ immaculate thorax will distinguish it from *M. agnatus*.

It is said to be not rare in the central and northern districts of the Continent; and has been bred in Prussia by Brischke from *Sesia formicaeformis*, *S. sphegiformis*, and *S. hylaeiformis*. Harwood records it from Essex; and Buckler in Britain from *Trochilium culiciforme*, whence it was raised by Marshall (Ent. Ann. 1874, p. 125), and *T. formicaeforme*; in the Proc. S. Lond. Soc. 1896, p. 81, it is assumed (doubtless incorrectly) to have emerged from *Retinia pinicolana*, Dbl. I have recently received many specimens all bred from *Sesia andrenaeformis* by the Hon. N. C. Rothschild, Whittle of Southend, Edelsten at Folkestone, who bred both

sexes in August; and on 13th August, 1907, Bankes sent me two males and six females alive, which had just emerged from mid-Kent *Trochilium andrenaeforme*; one of these females lived in a dark pill-box till 23rd inst. and I noticed that when just dead the eyes of this species are of a beautiful peacock blue and iridescent.

## 6. impressor, Grav.

*Lissonota impressor*, Gr. I.E. iii. 50, excl. varr. 1 et 2. *Meniscus impressor*, Tasch. Zeits. Ges. Nat. 1863, p. 289; Schm. Opusc. Ichn. 1275, ♂ ♀. *Lissonota impressor*, Thoms. O. E. xiii. 1419, ♀. (?) Var. *L. suborbitalis*, Gr. I. E. iii. 42, ♂.

A slender, black species with the mouth and legs alone red, and the terebra elongate. Head evenly and distinctly punctate throughout; frons neither impressed nor striate; all the orbits immaculate; ♂ with mouth except apices of mandibles flavous, ♀ with the clypeus and palpi testaceous and mandibles black. Antennae subfiliform; of ♂ apically rufescent beneath and fully as long as, of ♀ longer than half, the body. Thorax gibbous, subparallel-sided and immaculate; notauli obsolete and very broad; metanotum rugulose and somewhat distinctly sulcate centrally, with the base more evenly punctate; petiolar area basally entire and in ♂ strong; spiracles distinctly oval. Scutellum black and evenly punctate. Abdomen subcylindrical, of ♀ longer and hardly narrower than head and thorax, of ♂ narrower, linear and nearly double length of head and thorax; basal segment elongate, sulcate to beyond its centre and, like the following, finely punctate-reticulate; apex of basal segment strongly elevated and nitidulous in the centre; following apically sub-elevated, with the second longer than broad; terebra slender and distinctly longer than the body (body 13, terebra 15, mm.), with the spicula castaneous or testaceous. Legs somewhat slender, red; hind tarsi and whole of their basally arcuate tibiae nigrescent; ♂ with the anterior coxae and trochanters rarely paler beneath; tarsal claws distinctly and evenly pectinate. Wings normal and slightly clouded with stigma and radius luteous, radix and tegulae substramineous and sometimes dark-marked; areolet regular and subpetiolate, emitting recurrent nervure from almost the centre; nervellus intercepting at the lower third. Length, 12—13 mm.

At once known by its slender body, the entirely immaculate face and thorax, the linear ♂ abdomen and elongate ♀ terebra. Schmiedeknecht says the ♀ occasionally has the scutellum pale-marked. It is far less like *M. setosa* than Thomson would lead one to suppose. *M. suborbitalis* is probably a good and distinct species, of which I have several ♂♂ from Shere, but the ♀ is still unknown.

This species is rare in central Europe, occurring on umbelliferous flowers from July to September. Giraud, doubtless incorrectly, records *Lissonota impressa*, Gr., from *Bombyx quercus* (Ann. Soc. Fr. 1877, p. 408). This species is certainly very rare with us and it is my new *M. sulcator*, with pale ♂ orbits and terebra only as long as the body, which has been hitherto known in Britain by this name and to which the following records refer: Bickleigh and Marsh Mills, Devon, in August and September; common in Norfolk; and occurring in Essex. I do not find that it has hitherto been bred but early in July, 1905, Cockayne sent me a ♂ raised from an unknown Irish Lepidopteron; on 18th July, 1901, I received a female from Haggart, bred at Galashiels from *Sesia scoliiformis* and with it was its cocoon, which is wine colour and quite transparent, very smooth, shining and apparently not constructed with the double central fold, usual with these insects, since the centre is neither constricted nor of a different colour nor texture, it is 13 mm. in length and about 4 broad in the centre, the emergence hole is very irregular but hardly reaches the apex; on 10th July, 1907, Reid raised another female from a larva of the same host taken at Rannoch, in Perthshire. Dours (Cat. 66) certainly erroneously gives this species as "parasite de la larve de la *Carposapsa amplana* vivant sur les glands."

### 7. *murinus*, Grav.

*Lissonota murina*, Gr. I.E. iii. 99; Schöff. F. G. cxvi. 23; Holmgr. Sv. Ak. Handl. 1854, p. 92, ♀. *Exetastes albitarsus*, Gr. I.E. iii. 430, ♂ ♀. *Tryphon albitarsorius*, Zett. I.L. 385, ♂ ♀. *Meniscus murinus*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 62; Tasch. Zeits. Ges. Nat. 1863, p. 289; Schm. Opusc. Ichn. 1272, ♂ ♀. *M. variipes*, Szepel. Term. Füz. 1900, p. 36, ♀.

Head black and punctate with grey pilosity; face and base of mandibles finely granulate; clypeus castaneous and smooth with a few scattered punctures and the apex rounded; second and third joints of maxillary palpi castaneous; mandibles apically glabrous with two short teeth of equal length. Antennae filiform and shorter than the body; black with the flagellum rufescent beneath. Thorax pilose and immaculate; meso- and meta-notum dull and scabriculous, latter with spiracles almost circular and basal carina of petiolar area centrally produced, indicating apex of an obsolete areola. Scutellum pilose and black with its basal impression smooth, glabrous and shining. Abdomen a little longer but hardly narrower than head and thorax, of ♂ subcylindrical and of ♀ fusiform, red with the basal segment except sometimes its extreme apex black and the anus very rarely slightly infusate; basal segment nearly twice longer than broad, canaliculate, a little narrowed basally, glabrous and shining with the spiracles small and a little before the centre, extreme basal angles subdeplanate and explanate; remainder finely and transversely

alutaceous, interspersed with fine punctures towards apex of third and fourth, and throughout fifth and sixth, segments; anal styles exerted; second ventral segment shortly plicate in ♀; terebra stout and distinctly shorter than the abdomen, with smooth black valvulae and red spicula. Legs stout and fulvo-castaneous with the base of all the tibiae broadly, hind tarsi with joints two to four and often most of the fifth, white; third and fourth joints of the intermediate tarsi white in ♂, ferrugineous in ♀; all the coxae, trochanters and more or less of the hind femora towards their apices, black, the former finely and distinctly punctate, with white pilosity; posterior coxae apically emarginate and externally produced. Wings somewhat clouded with nervures and stigma piceous; tegulae infusate and often basally white; areolet regularly triangular, petiolate or subpetiolate, emitting recurrent nervure from beyond its centre; nervellus curved and intercepting in the centre. Length, 10—12 mm.

At once known from all other *Menisci* by its red abdomen and coarse brownish pilosity. The legs are variable in the extent of infusate colouration, which is often shared by the tibiae. This species is said to have constituted the genus *Alloplasta* of Förster, though his characters are inconstant and valueless; it is, nevertheless, very different in shape and conformation from the above species of this genus.

Respecting the synonymy of *Exetastes albitarsus*, no doubt can, I think, remain since Gravenhorst's two descriptions are word for word the same, excepting a slight divergence in the colour of the flagellum and tegulae. Bignell (Trans. Devon. Assoc. 1898, p. 504) says he has bred *M. murinus* from *Chrysis neglecta*, which was parasitic upon *Odynerus spinipes*, and that he considers this species structurally distinct from *E. albitarsus*, though no differences are specified and, judging from its host, his insect was probably incorrectly named; Bridgman considered them synonymous (Trans. Norf. Soc. 1893, p. 624).

This species is one of the commonest throughout Europe and appears on the Continent, where strangely enough it has never been bred, as early as the end of April. With us it is common enough, though not abundant; it is recorded from the Lands End district, Bickleigh and as common in Norfolk; in the Victoria History it is mentioned from Reading, Hastings, Guestling and Essex; I have seen examples from Copdock in Suffolk, Boars Hill and Shotover near Oxford, Devonshire, Derbyshire, Folkestone, West Malvern, Kings Lynn and Ballaugh in the Isle of Man. During the first half of June I have observed the females flying along whitethorn hedges at the Bentley Woods near Ipswich in search of their hosts and alighting upon the leaves, as though to rest, with fast vibrating wings, like those of the *Cryptinae*; when first emerged in May, they are fond of frequenting blackthorn bushes, though I am not sure that the

blossoms have any attraction for them. I possess specimens from Felden (Piffard), New Forest (Miss Chawner), Carlisle (Day), Bristol (Charbonnier), South Leverton and Treswell Wood in Notts (Thornley), Shere (Capron), and Lyndhurst (Adams), where I have myself taken it in his garden in June. Two females were bred on 24th and 28th April, 1899, from *Taeniocampa miniosa* at Selby in Yorks by Rev. C. D. Ash. Blair has sent me both sexes bred in the New Forest on 3rd April, 1904, from the same host; he adds: "a good number were obtained from one batch of these larvae, which were taken when quite young; the host goes down into the earth, but the parasite destroys it before it pupates"; he also sent the parasites' cocoon, which is very dark red,  $12\frac{1}{2}$  mm. long and 4 mm. broad in the centre, which is slightly constricted throughout its circumference; its apices are strongly obtuse and the emergence hole is very irregular, much longer than broad and hardly reaching to the apex of the cocoon. On 10th May, 1899, W. M. Christy also bred this species from the red form of *Taeniocampa gracilis* in the New Forest; and Tuck has found it at Tostock in Suffolk.

#### 8. *plantarius*, Grav.

*Phytodietus plantarius*, Gr. I.E. ii. 941; Tasch. Zeits. Ges. Nat. 1863, p. 192; Schm. Zool. Jahr. 1900, p. 342, ♀. *Meniscus plantarius*, Brauns, Zeits. Hym.-Dip. 1901, pp. 160 et 177, ♂ ♀.

♀. Head not narrowed behind the eyes; face and frons somewhat flat, dull, evenly and closely punctate; clypeus apically badius. Antennae stout, filiform and a little shorter than the body with the central joints broadly ferruginous beneath and apex obtuse. Thorax gibbous, dull, closely and coarsely punctate; a small and circular white spot on either side on front of mesonotum; metathorax evenly, confluent and not very finely punctate, dull; petiolar area basally obsolete; spiracles almost circular. Scutellum distinctly convex and black. Abdomen subpetiolate, oblong-ovate, somewhat dull, finely and transversely aciculate, as long as the head and thorax; first segment basally canaliculate, hardly twice longer than broad and gradually narrowed basally, with the conspicuous spiracles between the centre and base; second sometimes laterally bright red at the apex; hypopygium retracted; terebra as long as the abdomen, with spicula red or flavidous. Legs somewhat dark red with the coxae and trochanters black; all the tibiae distinctly white at their base; hind tarsi and apex of their tibiae black with joints two to four of the former, except internally, pure white; apices of the hind femora black; claws finely setiferous, hardly pectinate. Wings normal and a little clouded; stigma and radius nigrescent, tegulae and radix castaneous; areolet sessile or subpetiolate and nearly regularly triangular, emitting the recurrent nervure



from near its apex, but much narrower with the nervures thicker than in *Phytodiaetus*; nervellus intercepting a little below the centre. Length, 10—12 mm.

Gravenhorst truly says that this ♀ is similar in size and conformation to *Exetastes albitarsus*, but with the first segment a little narrower basally; it is, indeed, remarkably like a black-bodied *M. murinus*, for which I at first mistook it, but the base of the abdomen is not at all nitidulous, the antennae are much stouter and more obtuse apically, the recurrent nervure is emitted much nearer the apex of the areolet, etc.

Schmiedeknecht says it is only known from Germany and Austria, and is there very rare. Tosquinet, however, records it from Diest, where it was captured by Wesmael; and it has stood in our lists since 1856. I possess two females; one was taken about Bury St. Edmunds by Dr. Wratislaw many years ago, the other emerged on 12th April, 1902, from its own cocoon, which exactly resembles that of *M. murinus* described above in every particular; this was dug up at the roots of an oak tree at Cardiff on 28th of the preceding month by Campbell-Taylor: hence it may be presumed to prey upon some oak-feeding larva and, like its relative, to emerge in the early spring, since not sufficient time elapsed between discovery and emergence to allow its artificial surroundings to have any potent influence upon its development. Buckler, I see, records it from *Taeniocampa populeti* upon Harwood's authority.

### PHYTODIAETUS.

*Phytodietus*, Grav. I.E. ii. (1829), 929.

Body smooth and graceful, not strongly and elongately pilose. Antennae as long as body, more or less slender with the apical joints cylindrical and not discreted. Notauli anteriorly distinct; metathoracic costae entirely wanting, metapleurae longitudinally subsulcate near the circular spiracles. Scutellum somewhat convex and usually pale-marked; frenum concolourous. Abdomen smooth with a shining bloom and not punctate, often with the segments pale-margined; anus sometimes sub-compressed; hypopygium retracted; basal segment convex and not carinate; spiracles of the second close to the lateral margin; terebra longer than half, but not than the whole, abdomen. Tibiae spinulose, with their calcaria elongate; tarsal claws very closely and distinctly pectinate. Areolet broad and obliquely triangular, emitting the recurrent nervure from hardly before its apex; nervellus intercepting below the centre, sometimes at the lower angle.

Gravenhorst placed this genus in the *Cryptinae*, along with *Mesochorus* and *Plectiscus*, which are now regarded as Ophionidous. He described

twelve species, all of which with possibly a single exception are now known as British. But his genus has been considerably distributed by subsequent authors and only three of the original species and the anomalous *P. corvinus*\* are now retained therein. Their subfusiform abdomen and thorax, attenuated basal segment and slender legs certainly ally them with the *Cryptinae*, while the occasionally subcompressed anus resembles that of the *Banchides*; they are, in particular, very liable to be mistaken for the Tryphonidous *Mesoleii*, from which it is difficult to instance any male distinction, though the exerted terebra renders the females obvious. The species are badly differentiated, owing to the lack of structural modification and instability of colour, upon which the earlier (and some of the modern) authors too much rely.

*Table of Species.*

- |       |     |   |                               |
|-------|-----|---|-------------------------------|
| (10). | 1.  | Genal costa inflexed; scutellum partly flavous.                     |                               |
| (5).  | 2.  | Cheeks as long as breadth of base of mandibles.                     |                               |
| (4).  | 3.  | Brightly flavous-marked; flagellum longer and mainly red . . . . .  | 1. POLYZONIAS, <i>Forst.</i>  |
| (3).  | 4.  | Obsolutely whitish-marked; flagellum shorter and infusate . . . . . | 2. CORYPHEUS, <i>Grav.</i>    |
| (2).  | 5.  | Cheeks much shorter than breadth of base of mandibles.              |                               |
| (7).  | 6.  | Mesonotum discally rufescent; ventral plica flavous . . . . .       | 3. ORNATUS, <i>Desv.</i>      |
| (6).  | 7.  | Mesonotum immaculate; ventral plica infusate.                       |                               |
| (9).  | 8.  | Stouter; hind femora black before apex . . . . .                    | 4. GENICULATUS, <i>Thoms.</i> |
| (8).  | 9.  | Slenderer; hind femora usually immaculate red . . . . .             | 5. OBSCURUS, <i>Desv.</i>     |
| (1).  | 10. | Genal costa continuous; scutellum entirely black . . . . .          | 6. ASTUTUS, <i>Grav.</i>      |

\* PHYTODIETUS CORVINUS, Gr. I.E. ii. 937, ♀.

♀. Head with the cheeks subbuccate; palpi and centre of mandibles stramineous. Antennae, thorax and scutellum immaculate. Abdomen fusiform, as long as head and thorax and very slightly narrower than the latter, becoming somewhat compressed towards the anus; first segment gradually narrowed towards the base, twice longer than broad; terebra nearly as long as abdomen. Legs red with all the coxae, and the apices of the hind tibiae, black; posterior tarsi nigrescent. Wings very slightly clouded; stigma, radius and tegulae infusate, radix stramineous; areolet irregularly triangular and sessile. Length, 9 mm.

Gravenhorst says this species differs from the remainder of the species of *Phytodietus* in its larger head and subquadrate vertex, in which it resembles the *Xorides*; and from *P. (Cryptopimpla) calceolata*, with which it otherwise agrees and is given as synonymous by Kirchner, besides the shape of the head, in having the first segment less constricted basally. Schmiedeknecht (O.I. 1256, following Taschenberg, Z.G.N. 1863, p. 294) says that it cannot appertain to the present genus on account of its almost cubical head and completely areated metathorax.

The savans are still utterly ignorant of this insect, Desvignes claimed to possess it in his collection from Britain in 1856; and in his "Lepidoptera of Dorsetshire," C. W. Dale is good enough to inform us that he captured a specimen on 21st June, 1867, at Glanvilles Wooton (p. 77); this was in Broad Alders, as the same author says in his "History" of that parish (p. 69), wherein he terms this species "Very rare"! It is now in the Dale Collection in the Oxford Museum.

1. *polyzonias*, Forst.

*Ichneumon polyzonias*, Forst. Nov. Spp. Ins. 85; Gmel. S.N. i. 2712, ♂. *Lissonota polyzonias*, Gr. I.E. iii. 68; Tasch. Zeits. Ges. Nat. 1863, p. 281, ♂. *L. pectoralis*, Gr. I.E. iii. 69, ♂; Ratz. Ichn. d. Forst. ii. 97, ♀; cf. Tasch. Zeits. Ges. Nat. 1863, p. 282. *Phytodietus segmentator*, Gr. I.E. ii. 944; Tasch. Zeits. Ges. Nat. 1863, p. 291, ♂ ♀; (? Ste. Ill. M. vii. Suppl. p. 1, pl. xxxix, fig. 3, ♀; Holmgr. Sv. Ak. Handl. 1854, p. 90; lib. cit. 1860, n. 10, p. 63; Thoms. O.E. viii. 773; Schm. Zool. Jahr. 1900, p. 339, ♂ ♀). *P. coryphaeus*, var. 3, Gr. I.E. ii. 947, ♀.

Head very narrow behind the eyes, with the mouth and vertical orbits broadly flavous; ♂ also with the cheeks, frontal orbits to occiput and usually the whole face bright flavous. Antennae very slender and distinctly longer than the body; scape black and in ♂ flavous beneath; flagellum entirely testaceous, with the basal joints in ♂ infusate above. Thorax black; of ♀ with only subhamate marks and callosities before the radix on either side, another below it and a centrally interrupted fascia across the metathorax testaceous; but ♂ with the pronotum, sternum, apically hamate marks before the radix, two large callosities beneath it, two subtriangular marks on disc of the mesonotum, lateral sutures and a subcruciform metanotal mark or arcuate fascia, with often spots above the hind coxae, bright flavous; ♂ with mesopleurae and sternum usually, though not always, concolourous. Scutellum, postscutellum and both freni bright flavous, with a constant central longitudinal mark at the base of the scutellum black. Abdomen a little longer than the head and thorax and in ♂ slightly narrower than the latter; all the segments brightly glaucous-flavous margined; basal segment of ♂ sublinear and fully twice longer than broad, of ♀ broader and only half as long again as broad, in both sexes subparallel-sided and distinctly explanate on either side at the base; ♂ with second and third segments longer than broad and the fourth quadrate, ♀ with the second quadrate and the following transverse, all nitidulous and obsoletely shagreened with short, close, recumbent golden pubescence; ♂ valvulae subexserted; abdomen 4 mm., terebra 3 mm. Legs pale fulvous and distinctly elongate; ♂ with the anterior coxae and trochanters stramineous and the intermediate coxae black-marked; hind trochanters and in ♂ coxae laterally above, the tarsi and most of their tibiae, black. Wings iridescent and very slightly clouded; stigma and radius testaceous, radix and tegulae stramineous; areolet acutely triangular and subpetiolate, emitting the recurrent nervure only just before its apex; nervellus interrupting at lower third. Length, 7—8 mm.

The ♂ of *L. polyzonias* is said by Gravenhorst to be related to both *L. culiciformis* and *L. (Syzeuctus) irrisorius*; the colour is somewhat similar,

but the conformation of the tarsal claws and broad areolet are quite different. Like *P. coryphaeus* it is easily known, says Holmgren, from *P. obscurus* by the cheeks being broader than the basal width of the mandibles. *L. pectoralis*, which is a ♂ form of the present species with the areolet minute or obsolete, the antennae subflavous beneath, the anus and pro- and meta-thorax immaculate, is recorded by Gravenhorst as taken by Hope at Netley in Shropshire.

The synonymy of this genus has become considerably involved and after protracted research, I am very strongly of the opinion that J. R. Forster's species of 1771 is entirely synonymous with Gravenhorst's *P. segmentator*; Schmiedeknecht in 1907 says that *P. coryphaeus* differs from the latter in nothing but colour, and that *P. segmentator*, is the commonest species throughout the palaearctic region. This leads me to suspect that the true *P. segmentator*, described above, is unknown to him, for it very materially differs from *P. coryphaeus*, as I have indicated under the latter species.

Stephens, in his supplement, tells us *P. segmentator* has been found in the vicinity of London, but appears rare; Bignell says he bred it in south Devonshire on 15th January from presumably forced *Peronea hastiana* and in the middle of May from *Tortrix viridana*; Bridgman records it from Norwich, Wroxham and Lynn, in Norfolk, where Atmore, he adds, has raised it from *Tortrix decretana*; Marshall (Ent. Annual, 1874, p. 125) raised it from *Notodonta Chaonia*; and Harwood includes it in his Essex list. Brischke, who (Schr. Nat. Ges. Danz. 1882, p. 126) gives some account of its economy, tells us it also preys upon *Grapholitha roborana*, *Tortrix ribeana*, *T. laevigana* and *Cidaria galiaria*; and to these are added *Paedisca sordidana* by Sang (Entom. 1881, p. 141), *Phoxopteryx Mitterbacheriana* by Fletcher (l.c. 1883, p. 67), *Toxocampa cracca* and *Drymonia chaonia* (Buckler). Probably the majority, if not all, of these records refer to *P. coryphaeus*, for I find this species under both names in Capron's collection from Shere in Surrey. My own experience is that *P. polyzonias* is a distinctly uncommon species in Britain, and I possess but five examples, comprising two females taken at Courten in Ireland by Beaumont on 8th Septembr, 1893, and at Lynton in Devonshire by Stanley Edwards in 1890; and three males of which one was captured by Bloomfield at Guestling in Sussex, as recorded by me in the Victoria History of that county, one in the New Forest by Miss Chawner and the last I swept from a hedge-bank in a lane at Dunwich in Suffolk on 7th August, 1900. I consider the insect recorded under the name *Peltastes polyzonias* (Ent. Mag. 1835, p. 43) as more probably synonymous with *Metopius micratorius*, Fab., than the present species, with which it is erroneously given as identical in Stephens' Cat. 350.

2. *coryphaeus*, Grav.

*Phytodietus coryphaeus*, Gr. I.E. ii. 945, excl. var. 3; Tasch. Zeits. Ges. Nat. 1863, p. 292, ♀; Schm. Zool. Jahr. 1900, p. 340, ♂ ♀. (♂ *P. segmentator*, auctt. part. cf. *supra*.)

Head not very narrow behind the eyes; epistoma a little prominent; ♀ with palpi and mandibles except apically testaceous, clypeus ferrugineous and the vertical orbits flavous; ♂ with the whole face, mouth, cheeks and frontal orbits to occiput, flavous. Antennae slender and a little longer than the body; black, often dull ferrugineous beneath, but never clear red or testaceous. Thorax black; of ♀ often with only a small callosity before the radix, but more usually with subhamate lines before and callosities beneath radix and a centrally interrupted metathoracic fascia, more or less flavous; ♂ with part or whole of pro- and meso-sternum, and a small mark on mesopleurae, also concolourous. Scutellum with a basal dot on either side, its apex, a dot or line on the postscutellum, and often the freni narrowly, flavous. Abdomen shining with all, or only the apical segments, or none of them, narrowly and obsoletely glaucous-margined; basal segment of ♂ not more than half as long again as, of ♀ very little longer than, apically broad, in both sexes explanate towards the apex, not parallel-sided nor basally explanate; ♂ with second and third segments quadrate and the fourth, like the second and following of ♀, transverse; ♂ valvulae exerted; abdomen 4 mm., terebra  $2\frac{1}{2}$  mm. Legs red; coxae black with the hind pair of ♀ usually mainly red, ♂ sometimes with the anterior entirely and the hind ones beneath flavous; trochanters red or flavous with the hind ones and sometimes also the anterior partly black; hind tarsi and apices of tibiae infuscate. Wings iridescent and subhyaline; stigma and radius testaceo-stramineous, radix and tegulae whitish; areolet irregularly triangular or oblique, petiolate or subpetiolate; nervellus not intercepting above the lower fourth, often almost at the lower angle, but a little higher in ♂. Length, 6—7 mm.

Var. Basal scutellar pale dots wanting: ♂ with clypeus and epistoma laterally, and base of mandibles, black.

Gravenhorst distinctly says that the ♀ of this species is similar in conformation to *P. segmentator* (*polyzonias*), but with the antennae a little longer and terebra a little shorter: Schmiedeknecht contradicts this assertion by saying that it differs therefrom in nothing but colour. According to my synonymy, it differs very considerably and principally in those directions indicated by its author:—In its distinctly shorter legs, antennae and abdomen, posteriorly broader head, lower interception of the nervellus, longer and sparser grey abdominal pubescence, much less bright and

profuse flavidous markings, in never having the scutellum laterally flavous throughout as is invariably the case in *P. polyzonias*, from which it is best distinguished by the relative length of its much less slender and always darker antennae; these in *P. polyzonias* ♀ are 9 mm. to the body-length of 7 mm., ♂  $8\frac{1}{2}$  mm. to body  $7\frac{1}{2}$  mm.; in *P. coryphaeus* ♀ they are only  $7\frac{1}{2}$  to body 7 mm. and in ♂ 8 to body  $7\frac{1}{2}$  mm.

The present species, and not *P. polyzonias* as suggested by Schmiedeknecht is the common species of the genus, at least in Britain. That he confused *P. polyzonias* with it is I think apparent when he says that they occur in the same localities and agrees with Brischke that they are synonymous, since the latter was unable to determine to which to assign his bred males from *Penthina salicana*, *Grapholitha roborana*, and *Tortrix viridana*, from the last of which Bignell also records it (Entom. 1881, p. 141), adding (Trans. Devon. Ass. 1898, p. 504) that it emerged towards the end of July, in Devonshire, where he has also captured it at Bickleigh in May and Cornwood in the middle of June. Marquand says he has taken it in the Lands End district; Bridgman gives it as common in Norfolk and bred by Atmore from *Peronea hastana*, *Platypteryx falcula* and *Phlaeodes tetraquetra*; Buckler as bred in Britain from *Noctua brunnea*; and it is recorded by me from Co. Kerry in Ireland (Irish Naturalist, 1903, p. 68). I have numerous examples of both the type form and my variety. The former has been found by Capron about Shere in Surrey, Piffard about Felden in Herts, Charbonnier at Redland near Bristol, Bloomfield at Guestling near Hastings, Wilson Saunders at Greenings in Surrey, Rev. F. D. Morice among heather at Brockenhurst at the end of August, 1901, Whittle has bred it at Southend from aspen and probably from *Clostera reclusa* contained therein; and I took it at Stoke-by-Clare in Suffolk on Heracleum flowers on 14th June, 1900. The variety with basally immaculate scutellum is less common, though Capron has a full series and it has been taken by Piffard at Felden and Tuck at Tostock, in Suffolk, early in June; Haggart took the female abundantly on aspen leaves on 11th September, 1900, at Galashiels; and on 22nd August, 1901, I found it on Angelica flowers at Matley Bog, in the New Forest.

### 3. *ornatus*, Desv.

*Phytodietus ornatus*, Desv. Cat. 69, ♀. *P. rubricosus*, Thoms. O. E. viii. 773; Schm. Zool. Jahr. 1900, p. 339; Opusc. Ichtn. 1253, ♂ ♀. *P. rufipictus*, Brisch. Schr. Nat. Ges. Danz. 1882, p. 126, ♀.

Head with the mouth, often two facial dots beneath the scrobes and two larger ones at the vertical orbits flavous; ♂ with the face entirely flavous. Antennae very slender and nearly as long as the body, in ♂ fully as long; testaceous, with the scape pale, beneath. Thorax with a broad hamate mark on either side of mesonotum, a callosity before and a

larger one beneath the radix, flavous; two parallel and basally explanate vittae on the mesonotum testaceous-red; pleurae, sternum and two circular spots above the hind coxae, red; ♂ with the mesosternum flavous; metathorax dull and shagreened, gradually sloping throughout, centrally subsulcate; petiolar area not basally carinate; apophyses indicated. Scutellum large, flavous and discally fulvous with its basal angles, an oblong spot on the postscutellum and both freni, flavous. Abdomen smooth with the apical segments obsoletely and narrowly glaucous; basal segment twice longer than apically broad, slightly constricted before the basal excavation; second not transverse and sometimes narrowly pale apically; plica white; terebra fully half length of the abdomen. Legs flavous, slender and elongate; front coxae and trochanters stramineous; hind legs fulvidous with their femora apically, trochanters externally, tarsi and tibiae except the base of the latter, infusate. Wings hyaline with the radix and stigma pale; areolet obliquely triangular and subpetiolate, emitting recurrent nervure from its apex; nervellus below centre. Length, 8—9½ mm.

This very distinct species is at once known by its large size and the broadly red mesonotal vittae; its legs and antennae are decidedly elongate.

It is at present known under Thomson's name on the Continent, but there is no shadow of doubt regarding the synonymy of Desvignes' species, by which name it must of course be termed.

Desvignes described this species from a single female in his own collection, now in that of the British Museum; this I have examined. Thomson's specimens were found in Sweden and Brischke took his female in Prussia towards the end of September, 1852; it also occurs in Thuringia and Belgium in May, but appears to be local and not widely distributed. Dale (E. M. M. 1903, p. 100) says he has found both sexes at Glanvilles Wootton, in Dorsetshire, and Marshall also had both. I possess both from Shere in Dr. Capron's collection whence he recorded them in 1885 (E. M. M. 1886, p. 264) and Beaumont took several specimens at Gosfield, in Essex; one female of his I have is dated 14th June, 1902.

#### 4. *geniculatus*, Thoms.

*Phytodietus geniculatus*, Thoms. O.E. viii. 774, ♂ ♀.

This species has the hind femora black before, but not at their apices. Length, 7 mm.

It so closely resembles *P. polyzoniæ* (*segmentator*, *auctl.*) that even Thomson gives no individual diagnosis; he simply says that it differs from the latter in having the first segment more strongly narrowed

towards its base, the terebra shorter with its valvulae more strongly pilose, and the hind knees pale with a black band before their apices. Schmiedeknecht (Zool. Jahr. 1900, p. 340) adds nothing to this, but considers it agrees with his *P. segmentator* in having the hind femora and tibiae not entirely black, the abdominal segments pale-banded, the thorax not red marked and the scutellum partly flavous. My ♀, but not my ♂, has the basal angles of the scutellum, and the apical margins of the segments, narrowly flavidous. It is certainly a good species, with the antennae much longer and more slender than those of *P. coryphaeus*, and darker and more attenuate apically than those of *P. polyzonias*.

It has hitherto only been noted from Sweden; but I possess a single male in Capron's collection, presumably from Shere in Surrey and a single female from Beaumont's collection, captured by him at Oxshott in the same county on 28th September, 1892.

### 5. *obscurus*, Desv.

*Phytodietus obscurus*, Desv. Cat. 69; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 64; Schm. Zool. Jahr. 1900, p. 341; Opusc. Ichn. 1255, ♂ ♀.

Head hardly narrowed behind the eyes; cheeks short, space between eyes and base of mandibles hardly more than half breadth of the latter; of ♀ immaculate, of ♂ with the face, mouth, cheeks and vertical orbits, flavous. Antennae slender, filiform and nearly as long as the body; scape of ♂ flavous beneath. Thorax gibbous and in ♀ immaculate; of ♂ often concolorous but usually with a line and callosity before the radix, pleurae and sternum entirely or in part and an obscure spot on either side at apex of metathorax, flavous. Scutellum with or without a pale spot on either side at the base, its apex generally with an apical dot and the postscutellum flavous. Abdomen nitidulous and subsessile; apices of segments two or four to seven more or less obsoletely glaucous; basal segment gradually and only slightly dilated towards the apex and in ♀ discally sulcate; terebra shorter than the abdomen. Legs slender and fulvous with the coxae and base of trochanters black, of ♂ flavous beneath; hind tibiae and tarsi infuscate with the former in ♀ basally ferrugineous; hind femora immaculate red, or infuscate at their extreme apices. Wings ample, infumate-hyaline; tegulae, costa and stigma pale testaceous; areolet triangular and subpetiolate, with the outer nervure oblique. Length, 5—6 mm.

This species is very like *P. coryphaeus* but smaller, more slender and strongly nitidulous, and at once distinguished from it by the short cheeks.

No one seems to have noticed it since Desvignes first described it from two males and four females in the British Museum collection, which



I have not examined; and its subsequent record from Sweden by Holmgren. Tosquinet, however, (Ann. Soc. Belg. 1897, p. 319) tells us that Prof. Wesmael took it at Diest in 1848; and Bridgman regarded it as "common" in Norfolk. It is probably mixed with *P. coryphaeus* in collections. I have a male and two females found by Capron about Shere in Surrey, and have myself twice captured the latter sex: in the Bentley Woods, near Ipswich, on 23rd June, 1903 and by sweeping rank herbage in Barnby Broad on 18th May, 1905. On July 10th, 1901, a single male emerged (with *Pimpla ventricosa*, cf. ante, p. 91, and both sexes of a *Limneria*) from larvae of *Mompha* (*Larvina*) *conturbatella*, Hb., near Ashford in Kent; with it is its cocoon, which is pale testaceous and dull with a paler, narrow central band, it is  $7\frac{1}{2}$  mm. long and 2 mm. broad in the centre, and the parasite emerged from a circular hole well before the apex.

#### 6. *astutus*, Grav.

*Phytodictus astutus*, Gr. I.E. ii. 939; Tasch. Zeits. Ges. Nat. 1863, p. 292; Schm. Opusc. Ichn. 1256, ♀. *P. continuus*, Thoms. O.E. viii. 773.

Head immaculate; genal costa not inflexed. Antennae filiform and nearly as long as the body. Thorax gibbulous; pronotal epomia indicated; mesosternum laterally very closely and very finely punctate. Scutellum entirely black. Abdomen subsessile, oblong, as long and as broad as the head and thorax, with the anus subcompressed; basal segment smooth, twice longer than broad and gradually explanate apically; entirely black; terebra a little longer than half the abdomen, with the spicula fulvous. Legs normal, somewhat slender, fulvous; coxae and trochanters black; hind tarsi and tibiae infusate, the latter becoming subrufescent basally. Wings normal, subhyaline and iridescent; stigma and radius piceo-stramineous; radix and tegulae stramineous; areolet irregularly subtransverse and petiolate. Length, 6 mm.

The ♂ does not appear to be yet known; Thomson does not indicate whether he knew it or not, but he says that even the mouth is black, and it is nearly certain that the ♂ would have at least part of the head pale-marked.

Gravenhorst remarks upon the relationship set up by the compressed anus to the *Banchides*.

This species is said to occur uncommonly on umbelliferous flowers in July in Sweden and Germany. Marshall recorded it from Britain in both his Catalogues, but beyond this I knew nothing of it as indigenous and none of the local lists contain it; nor does it appear to have been yet bred.

## SYZEUCTUS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 167.

Metathoracic spiracles large and elongate; metapleurae not discreted throughout from the metanotum by a carina. Areolet elongately petiolate; nervellus intercepting below centre; face more or less intumescent; notauli entirely wanting; scutellum laterally margined at the base only; basal abdominal segment glabrous with spiracles before its centre; tarsal claws shortly dentate and elongately setiferous. Thorax and abdomen rarely red, but usually very profusely flavous, marked; scutellum and postscutellum often entirely flavous. Frons sometimes bituberculate.

This genus has hitherto formed part of *Lissonota* in our British lists and in its general facies there is little distinction, but the large and elongate metathoracic spiracles are, I think, sufficient to warrant generic rank, to which its species were first raised by Thomson, under the name *Syzeucta*. The colouration of two of the British species is sufficient to superficially distinguish them from all our *Lissonotae*, of which the only kind with pale postscutellum has the abdomen mainly red; in the third the two acute frontal horns will at once distinguish it from all our other *Lissonotides*.

None of our species appear common, in fact two are very doubtfully indigenous; of the remaining eight palaearctic species of this genus, all but *Lissonota apicalis*, Grav. (= *L. petiolaris*, Grav.) have been described since 1888, and are of infrequent occurrence on the Continent; nor have they been bred.

As in the case of *Glypta*, I do not consider that the possession of a pair of small frontal tubercles, even when combined with traces of an apical metapleural carina, is sufficient to warrant the erection of a distinct genus (*Diceratops*, Först.) for the reception of *Lissonota bicornis*. The shape and size of the metathoracic spiracles has been found to be a good and natural character, since first enunciated by Wesmael in 1844, but small capital excrescences cannot, I think, be so regarded.

## Table of Species.

- |      |   |                              |
|------|---|------------------------------|
| (4). | 1. Frons mutic; abdomen not red.  |                              |
| (3). | 2. Petiolar area carinate; central segments elongate; wings apically infumate .. .. . | 1. MACULATORIUS, <i>Fab.</i> |
| (2). | 3. Petiolar area wanting; central segments transverse; wings hardly infumate .. .. .  | 2. IRRISORIUS, <i>Rossi.</i> |
| (1). | 4. Frons with two distinct horns; abdomen mainly red .. .. .                          | 3. BICORNIS, <i>Grav.</i>    |

1. *maculatorius*, Fab.

*Ichneumon maculatorius*, Fab. M.I. i. 261. *Bassus maculatorius*, Fab. Piez. 96. *Lissonota maculatoria*, Gr. I. E. iii. 60; Schöff. F. G. cxvi. 24, ♂; Boh. Sv. Ak. Handl. 1852, p. 117; Holmgr. *lib. cit.* 1860, n. 10, p. 48, ♂ ♀. *Syzeucta maculatoria*, Thoms. O. E. viii. 579 et xiii. 1415. *Syzeuctus maculatorius*, Schm. Opusc. Ichn. 1262. *S. bicolor*, Szepl. Term. Füz. 1900, p. 31, ♂ ♀.

Shining, punctate, black and profusely marked with flavous. Head short, transverse, closely and coarsely punctate, and narrowed behind the eyes; internal and external orbits, labrum and centre of mandibles, sometimes also two longitudinal lines and two dots on the face, or whole face except often a longitudinal black line, flavous. Antennae very rarely with the scape white-marked beneath; the fourth and following antennal joints ferrugineous beneath. Thorax distinctly, coarsely and somewhat sparsely punctate, a little shining; a mark before the radix and on the disc, usually also a more or less cordiform mark or transverse line before the petiole, a dot beneath the radix, another or a perpendicular line on the mesopleurae, the prothorax and sometimes a dot on the metapleurae, flavous; metathorax convex with the upper areae entirely wanting, but the petiolar distinct and complete; spiracles large and elongate. Scutellum and postscutellum flavous. Abdomen smooth and nitidulous with the three or four basal segments longer than broad and broadly margined with flavous; third of ♀ sometimes immaculate; terebra very slightly longer than the abdomen and distinctly reflexed. Legs slender, red; the anterior coxae flavous, of ♂ partly, the front ones of ♀ above, black; anterior trochanters flavous, of ♂ partly, of ♀ above, black; femora of ♀ fulvaceous, of ♂ paler with the anterior flavous beneath; hind femora nearly entirely black; tibiae fulvous with the hind ones apically darker, anterior of ♂ entirely or beneath flavous; tarsi concolorous. Wings hyaline with their apices very distinctly darker; stigma and radius infusate; radix and tegulae flavous, the latter rarely infusate; arcolelet nearly regular, elongately petiolate; nervellus oblique and intercepting below the centre. Length, 9—10 mm.

Holmgren considers the form with black hind femora in both sexes a variety, but it is certainly the commonest with us; he says the ♀ sometimes has the clypeus fulvous with the thorax and hind femora entirely black and the second and third segments alone apically stramineous; or with face, thorax and scutellum immaculate, and the three basal segments apically castaneous. In fact the flavidous markings vary within certain limits to a considerable extent, but the species may always be at once known from all others of *Lissonotides* by the very determinately infumate apices of all the wings.

Since none of our local lists contain this species, hitherto regarded in Britain as a *Lissonota*, except Dale, who records it in his "Lepidoptera of Dorset" from Lewell, Portland and Parley Heath, I conclude that it is uncommon, especially as its striking appearance renders it very conspicuous and unlikely to be passed over. I have, however, seen both sexes from Shere in Surrey, in Capron's collection, and males—which are the commoner sex—from Boxhill at the end of July, taken by Beaumont; Portland, on the 23rd of the same month, by Richardson; and from the New Forest, by Miss Chawner. It is said to be common in central and southern Europe but rarer in the more northerly regions, though Holmgren found it to frequent sandy places uncommonly in southern Sweden in July and August, and Tosquinet records it in the former month from Belgium. It has not been bred on the Continent, but both Mrs. Hutchinson and Big-nell have raised it in Britain from *Phycis Davisella*, Newm. (Entom. 1881, p. 141). Mr. E. R. Bankes has given me seven males and three females which he bred together between 11th and 29th of July, 1901, from larvae of the same species (*Nephoptyx genistella*, Dup.) at Corfe Castle, in Dorset. The parasitic larva appears to spin no outer web of its own, but to demolish the larva of its host as soon as it has completed its cocoon, wherein the parasite becomes a pupa; Bankes sent me seven of these pupae, besides three or four *in situ*, and each is dark red, nearly claret colour, dull, smooth, cylindrical and of equal breadth at both extremities, 8 mm. in length and 3 mm. in breadth, and from each the imago had emerged by entirely removing an operculum slightly on one side of the extremity.

## 2. *irrisorius*, Rossi.

*Ichneumon irrisorius* Rossi, Mant. ii, App. 82. *Lissonota irrisoria*, Gr. I.E. iii. 65; Tasch. Zeits. Ges. Nat. 1863, p. 281, ♂ ♀. *Syzeuctus irrisorius*, Schm. Zool. Jahr. 1900, p. 349; Opusc. Ichn. 1261; cf. Thoms. O. E. xiii. 1422.

Head closely and coarsely punctate, almost dull with the face a little more finely punctate; labrum subfulvous; all the orbits broadly, and generally a clypeal mark, pale flavous. Antennae filiform, shorter than the body, ferrugineous and apically dull flavescent, becoming nigrescent towards the base. Thorax gibbous; a large mark on the pronotum, a large triangular mark on each side on front and a spot on the disc of the mesonotum, marks before and beneath the radix, on the mesopleurae, and a broad and centrally explanate transverse line before the petiole, flavous; metathorax with no costae, spiracles large and elongate. Scutellum and postscutellum flavous. Abdomen nitidulous and badius, a little longer and narrower than the head and thorax, especially in the ♂; the six basal segments flavous-margined and the first also basally, or

laterally at the base, flavescent; basal segment half as long again as broad, the two following little broader than long, and the remainder transverse; central and apical segments finely and diffusely punctate; terebra black and hardly as long as the abdomen, with the spicula castaneous. Legs normal, fulvous; front ones usually subflavous beneath, with the anterior coxae and sometimes trochanters nigrescent; hind coxae and trochanters black, apically flavidous with their tarsi basally rufescent. Wings normal, subflavescent and only slightly clouded towards their apices; stigma and radius infusate, radix and tegulae flavous; areolet small, nearly regular and elongately petiolate. Length, 8—10 mm.

This species was thought by Thomson (*loc. cit.*) to be probably synonymous with *L. versicolor*, Holmgr., which, however, is retained by Schmiedeknecht (O.I. 1303) in the genus *Lissonota*.

The latter says this species is sparingly distributed in central, but very rare or altogether unknown in northern, Europe and apparently commonest in Pomerania; Klug took it about Berlin; Taschenberg in Saxony, where he bred a male from *Thalpocharis paula*; Kirchner records it from Vienna, and Rossi says that it occurs in woods. That it has any right to a position in our British list, I very much doubt: Marshall first introduced it as indigenous in his 1870 Catalogus, giving as a synonym *Lissonota deversor*. The latter is now known to be quite distinct and is established with us; but it appears probable that it was solely on the supposititious identity of these very distinct species (which appears to be of his own erection, since I find no other author venturing upon it) that the present insect was introduced. There are no records and I have seen nothing like it: it has played *irrisor* to my search.

### 3. *bicornis*, Grav.

*Pimpla bicornis*, Gr. Beit. Ent. Schl. 1829, p. 23, pl. i, fig. 11, ♂ ♀. *Lissonota bicornis*, Gr. I.E. iii. 91; Schöff. F. G. cxvi. 20 ♂, 21 ♀; Tasch. Zeits. Ges. Nat. 1863, p. 283, ♂ ♀. *Diceratops bicornis*, Schm. Zool. Jahr. 1900, p. 351; Opusc. Ichn. 1268, ♂ ♀. *Syzeucta bicornis*, Thoms. O.E. xiii. 1415, ♀.

Head with the face closely punctate and nearly dull; frons and vertex nitidulous, the former excavate with an erect and acute tubercle on either side; ♀ with clypeus ferrugineous and the orbits sometimes partly pale; ♂ with face and mouth flavous, palpi infusate, apices of mandibles and two dots above the clypeus black. Antennae filiform, a little shorter than the body, ferrugineous entirely or beneath; two basal joints black and in ♂ flavous beneath. Thorax gibbulous, coarsely and somewhat closely punctate, nitidulous; notauli wanting; ♂ sometimes with two flavous dots on the propleurae; metapleural carinae wanting basally; spiracles elongate and linear. Scutellum black and laterally not margined. Abdo-

men black, smooth, shining, deplanate-cylindrical, narrower than and double length of the thorax, of ♂ sometimes only half its breadth and apically subcompressed, elongate; four basal segments fulvous with the base of the first, and in ♀ the fourth except basally, black; first segment basally bicarinate with prominent spiracles, twice longer than broad with diffuse discal punctures; remainder finely and diffusely punctate, with the second and third segments longer than broad; terebra a little longer than the body or nearly double the length of the abdomen. Legs somewhat slender, fulvous; hind ones usually entirely black, of ♂ with the tibiae basally and more or less of the tarsal joints basally stramineous; anterior coxae and trochanters black, in ♂ flavous beneath. Wings of ♂ hyaline, of ♀ slightly clouded; stigma black or piceous; radix and ♂ tegulae stramineous, latter in ♀ black; areolet elongately petiolate; radial nervure curved throughout; nervellus intercepting below the centre. Length, 9—10 mm.

Gravenhorst mentions a variety of both sexes which is rather smaller with the hind femora red, the ♀ with the internal orbits very narrowly flavous and the hind tibiae rufescent before their base, and both sexes with the four basal segments entirely pale red.

It is said by Thomson to be similar to the ♀ of *Syzeuctus apicalis* in its size, conformation and subinfumate wings, but the thorax is more strongly punctate, the post-petiole red, the terebra longer and especially differing in the frontal horns.

This species is said to occur on umbelliferous flowers in northern and central Europe at the end of June and beginning of July, but is everywhere rare. As British it rests upon the assertion in 1856 by Desvignes that it was represented in Mr. Marshall's collection; but Marshall had many foreign insects there. It should, however, occur with us since Thomson has found it at Lund and Tosquinet in Belgium.

### PROCINETUS, Förster.

Först. Verh. pr. Rheinl. 1868, p. 167; *Heterolabis*, Kriech. Ent. Nachr. 1889, p. 18.

Arolet entire; metathoracic spiracles large and elongate; nervellus strongly postfurcal and intercepting far above the centre; hypopygium large, compressed and prominent; metathorax closely rugose punctate with no trace of areae, and even the basal carina of the petiolar area wanting; nervelet of the wings distinct; hind legs conspicuously thicker and larger than the anterior; claws not reaching beyond apices of the pulvilli; abdomen centrally red.

We may certainly accept *Procinetus* as a good genus on account of the height at which the transverse anal nervure of the hind wing is intercep-

ted and the very stout hind legs; it agrees with *Syrzeuctus* in the elongate and large metathoracic spiracles, and in general facies distinctly resembles *Acaenitus*, between which and the *Lissonotides* it may be considered to form a connecting link. It is placed in the *Acaenitini* by Ashmead.

It is to be supposed that we possess in Britain the only Gravenhorstian, of the nine palaearctic, species of this genus.

### 1. *decimator*, Grav.

*Lissonota decimator*, Gr. I.E. iii. 96; Schöff. F.G. cxvii. 13, ♀; *Tasch. Zeits. Ges. Nat.* 1863, p. 284, ♂ ♀. *Heterolabis crassula*, Kriech. Ent. Nachr. 1889, p. 18; *Procinetus crassula*, Schm. Zool. Jahr. 1900, p. 326; *P. decimator*, Schm. Opusc. Ichn. 1233, ♂ ♀. Cf. Thoms. O.E. viii. 762.

A large, short and stout species with incrassate legs; somewhat shining, punctate and black. Head hardly narrowed behind the eyes; frons and face coarsely and strongly punctate with the latter not centrally elevated; clypeus ferrugineous with the foveae obsolete; internal and generally the external orbits more or less distinctly castaneous or in ♂ flavous, though in ♀ sometimes immaculate. Antennae filiform, mainly ferrugineous; of ♂ hardly shorter than the body with the scape flavous, and flagellum ferrugineous, beneath; of ♀ rather shorter than the body, either black and ferrugineous beneath towards their apices, or ferrugineous with the three basal joints black. Thorax gibbulous and immaculate; metathorax with petiolar area entirely wanting and the spiracles elongate. Scutellum black. Abdomen deplanate, punctate, oblong, a little longer and in ♂ narrower than the head and thorax, becoming smoother and more shining apically; basal segment discally impressed, longer than the hind coxae, not elevated, strongly punctate with the apical margin centrally smooth, in ♂ basally constricted with prominent spiracles; following segments transverse in both sexes, of ♀ pale castaneous with the base of the first segment and anus black, and the fifth to seventh membranaceously white-margined, of ♂ with the four basal segments red, more or less broadly black-marked or mainly black; terebra somewhat longer, sometimes twice longer, than the body, black with spicula castaneous. Legs red and stout, with the hind ones longer and stouter; coxae and trochanters, anterior femora usually basally and the hind ones at the apex and in ♀ sometimes also at the base, hind tarsi and tibiae externally, infusate or black. Wings normal and, especially in ♀, somewhat clouded; stigma and radius piceous; radix stramineous, tegulae black or infusate; nervelet elongate; areolet emitting recurrent nervure nearly from its centre, of ♂ triangular, petiolate or sessile, very rarely pentagonal or obsolete, of ♀ small, irregular or subrhomboidal, more or less petiolate and sometimes obsolete; nervellus intercepting far above the centre. Length, 7—11 mm.

This species is said to occur in central Europe in June and July. It was introduced as British by Desvignes on the strength of specimens in the British Museum collection, which I have not examined; Harwood records it from Essex in his Victoria History list; and Bignell tells us he has bred it on both the 7th April and 4th May from *Gortyna flavago*; Cross and Norgate have raised it from the same host, according to Buckler. On the Continent, however, where Kriechbaumer thought it possibly parasitic upon an oak-feeding *Tortrix*, Schmiedeknecht says he has always found it on short-turfed hill-sides covered with *Euphorbia cyparissias*, which is not indigenous though often found in Britain. And it is upon the longicorn beetle, *Obera (Amaurostoma) erythrocephala*, Schr., living, as was first suggested by Panzer, in the stalks of this plant that *P. decimator* is suspected of preying. I think its hosts more likely to be lepidopterous.

### LAMPRONOTA, Haliday.

Hal. Ann. Nat. Hist. 1839, p. 120.

Clypeus discreted and apically subtruncate; frons convex and suglabrous. Antennae elongate, filiform and slender; flagellar joints not discreted, the first elongate, ♂ with third at apex and fourth at base externally excised. Thorax stout, gibbulo-cylindrical; mesonotum anteriorly elevated and perpendicular, notauli very deeply impressed; metathoracic areola coalesced with basal area, its longitudinal costae straight, parallel and entire from base to apex; lateral costae distinct; petiolar area short, basally curved and costate; spiracles oblong and transverse. Abdomen subsessile, evenly convex; basal segment dull, scabriculous and convex; anus subcompressed and laterally clavate, of ♀ with the venter apically cleft, the valvulae obtuse and terebra elongate. Hind legs distinctly a little stout, their tarsi and tibiae dark; tarsal claws simple. Areolet entirely wanting.

Probably the most natural position for this very distinct genus is among the *Atacnitides*, as was originally suggested by Haliday; the deep notauli and incrassate hind legs are very similar, but wherever placed, the unique conformation of the ♂ flagellum will render that sex abundantly distinct; both sexes are at once known from the remainder of the *Lissonotides* by the entire metathoracic longitudinal carinae and, though with more uncertainty (for several species of *Lissonota* and *Meniscus*, e.g. *L. variabilis* and *M. sulcator*, occasionally have this cell externally pellucid or entirely wanting), by the absence of all trace of the outer nervure of the areolet. *Lampronota defectiva*, Grav., has long stood in our lists, but I am of opinion it is really referable to the genus *Meniscus*, as compared by its author; and it certainly is not synonymous with *L. melancholica*, as it is treated by modern authors, for the terebra, in this genus at least, appears of very constant length to me, a view in which our Continental friends are not prone to concur.



## Table of Species.

- (4). 1. Basal segment apically glabrous; third quadrate.  
 (3). 2. All coxae and trochanters red; terebra shorter than abdomen . . . . . 1. CALIGATA, Grav.  
 (2). 3. All coxae and trochanters black; terebra longer than abdomen . . . . . 2. MELANCHOLICA, Grav.  
 (1). 4. Basal segments dull throughout; third transverse . . . . . 3. ACCUSATOR, Fab.

## 1. caligata, Grav.

*Phytodietus caligatus*, Gr. I. E. iii. 936, ♂ ♀. *Cylloceria caligata*, Schiöd. Guér. Mag. Zool. 1839, Ins. p. 25, pl. x, fig. 1; Holmgr. Sv. Ak. Handl. 1854, p. 92. *Lampronota caligata*, Holmgr. Ofv. 1859, p. 128; Sv. Ak. Handl. 1860, n. 10, p. 48; Tasch. Z. G. N. 1863, p. 295, ♂ ♀. *L. crenicornis*, Hal. Ann. Nat. Hist. 1839, p. 121; Curt. B. E. pl. ccccvii, ♂ ♀. *Bassus nuntiator*, Zett. I. L. 381, ♂ ♀.

Head entirely black or with the mandibles dull ferruginous; frons a little concave and more finely punctate than the centrally subprominent face. Antennae black and in ♂ as long as the body. Thorax dull and immaculate, confluent and not very distinctly punctate; mesonotum anteriorly convex and perpendicular, notauli very deeply impressed, disc often basally substriate; metathorax rugulose with the lateral carinae, and the parallel-sided areola coalesced with the basal area, strong; petiole area short with its basal carina curved and distinct; spiracles transverse and oblong. Scutellum normal and black. Abdomen elongate-fusiform, nearly parallel-sided, black, somewhat nitidulous, finely and closely alutaceous with the segments usually narrowly and obsoletely ferruginous apically; basal segment rugose to near its smooth apex, gradually narrowed throughout and more abruptly from the conspicuous spiracles; of ♂ basally bicarinate and nearly twice longer than broad, of ♀ half



as long again as broad; second segment and in ♂ third quadrate, following transverse; terebra longer than half the abdomen (abdomen 5, terebra 4 mm.). Legs clear red, with only the hind tibiae and tarsi nigrescent; ♂ rarely with all the coxae and trochanters slightly infuscate. Wings distinctly a little clouded; stigma, radix and tegulae infuscate, latter apically paler; fenestrae widely discreted by a corneous line; nervellus intercepting in the centre. Length, 7—9 mm.

At once known from the remaining species by the red coxae of both sexes and its short terebra; the ♂ flagellar excision (figured) is broader.

A common species throughout Europe and the most ubiquitous of the genus in Britain from June to September. Not uncommon at Holywood in Ireland (Haliday); Bickleigh in Devon, in August (Bignell); Lands End district (Marquand); Bawsey Heath (Atmore) and Earlham, Norfolk

(Bridgman); Essex (Harwood). I have it from Shere in Surrey (Capron); Guestling, near Hastings (Bloomfield); Marvell Copse, in Isle of Wight, in September (Morey); Golspie, in Sutherland, at the end of August, 1900 (Col. Yerbury); and I have swept it in Chippenham Fen in Cambs, at the end of August, 1905. Nothing whatever appears to be known of its economy, which is probably not lepidopterous.

## 2. *melancholica*, Grav.

*Ichneumon melancholicus*, Gr. Mon. Ped. 123, ♂. *Tryphon melancholicus*, Gr. I. E. ii. 135, ♂. (?) *Mesoleius melancholicus*, Holmgr. Sv. Ak. Handl. 1855, p. 141, ♀. *Phytodictus niger*, Gr. l.c. 935, ♀. *Cylloceria nigra*, Schiöd. Guér. Mag. Zool. 1839, Ins. p. 23; Holmgr. Sv. Ak. Handl. 1854, p. 91. *Lampronota nigra*, Holmgr. l.c. 1860, n. 10, p. 47; Ofv. 1859, p. 128; Tasch. Z. G. N. 1863, p. 294, ♂ ♀. *L. fracticornis*, Hal. Ann. Nat. Hist. 1839, p. 121. *L. melancholica*, Schm. Ichn. Opusc. 1333 (part.). *Bassus affinis*, Zett. I. L. 382, ♂ ♀. *Chalincerus longicornis*, Ratz. Ichn. d. Forst. iii. 130, ♂.

Black with only the femora, anterior tibiae and tarsi red. Length, 8—10 mm.

So closely allied in sculpture and colouration to the preceding species as to need no detailed description. Therefrom it differs in having the metanotal carinae less strong, the frons more excavate and smoother, the face a little more finely punctate; the mesosternum, their pleurae below and all the coxae subglabrous and very strongly nitidulous; all the coxae and trochanters quite black; the ♂ with the third flagellar joint (figured) less broadly excised, the ♀ with the terebra longer than the abdomen (abdomen 5, terebra  $6\frac{1}{2}$ , mm.).



I am strongly averse to the opinion, expressed by Brischke and Schmiedeknecht, that the terebra varies in length; in all my examples it is quite stable in this respect.

This, also is a common species with us, and on the Continent even more abundant than the preceding. Ratzeburg (*loc. cit.*) says that Hrn. von Bernuth bred it from *Tortrix Buoliana*; but, without doubting his good faith, I should like confirmation of this record, which is the only hint we have of the economy of the present genus; I believe that their true position is in the *Acaenitides*, the typical genera of which are Coleopterous parasites; and it is certainly strange, with all our records of parasites of this moth (*cf.* List of Hosts, *post*), no one has again raised this abundant species since 1852.\* It is recorded from Bawsey Heath in Norfolk by Atmore; Dousland in Devon in August by Bignell; and I have many specimens from Shere in Surrey, Cannock Chase in June from

\* Since this was written I have noted Ratzeburg's record of *Tryphon melancholicus*, ♂ (Ichn. d. Forst. ii. 113): "Von Hrn. Prediger Neuhaus den 28 März aus *Tenthredo (Nematus) septentrionalis* erzogen;" quoted by Cameron, ii. 40.

Tomlin, The Mound in Southerland towards the end of August from Col. Yerbury, Selsley near Birmingham in the middle of May from Martineau, the New Forest from Miss Chawner, Crookston in Scotland early in June from Dalglish; and on 20th August, 1907, Elliott swept several males from herbage by the Tay, at Birnam, in Perth. Gravenhorst (i. Suppl. 688) records it from Netley, in Shropshire.

### 3. *accusator*, Fab.

*Ichneumon accusator*, Fab. E.S. ii. 172, ♀ (*nec* Jur.). *Pimpla accusator*, Fab. Piez. 117. *Lissonota accusator*, Gr. I. E. iii. 101; Tasch. Zeits. Ges. Nat. 1863, p. 290, ♀; *Cylloceria marginator*, Schiöd. Guér. Mag. Zool. 1839, Ins. p. 24, ♂ ♀. *Lampronota marginator*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 47; Schm. Opusc. Ichn. 1334, ♂ ♀. (?) *L. denticornis*, Hal. Ann. Nat. Hist. 1839, p. 121, ♂ ♀.

Head black with the mouth ferrugineous. Antennae slender and filiform, longer than half the body. Thorax gibbulous and immaculate; metathorax with four longitudinal costae. Scutellum black. Abdomen as long as head and thorax and a little narrower than the latter; basal segment entirely scabrous and black, the following black and finely coriaceous throughout, with the margin broadly pale castaneous; terebra as long as the abdomen, emitted from a ventral fold, black with the spicula fulvous. Legs normal and red with the coxae and trochanters black and the latter dull ferrugineous beneath; tarsal claws simple. Wings normal and somewhat clouded; stigma and radius piceous, radix paler and tegulae black; areolet wanting. Length, 8—10 mm.

The above description of Gravenhorst and Taschenberg leaves, I think, no doubt that *Lissonota accusator* is synonymous with *Cylloceria marginator* and not with *L. melancholica*, as has been tentatively surmised by Schmiedeknecht; the four longitudinal costae of the metathorax are found only in this genus throughout the Pimplinae, and the broad rufescent segmental margins only in this species; no mention is made of the darker hind tibiae, but Holmgren tells us this is a variable character.

From the two preceding species the present may be known by the rather stouter flagellum, less parallel-sided abdomen with the segments dull to their apices which are much more broadly red and closely sculptured, the third distinctly broader than long and the three basal not apically smoother; basal segment shorter and broader, terebra exactly (in my examples) as long as the abdomen, the coxae a little longer and the ♂ carinae more distinct.

This is a northern species, common in Sweden and Denmark; Gravenhorst records a single specimen from Gottingham and Tosquinet says it occurs in Belgium in June. With us it appears rare; there are specimens in the out-of-date British Museum collection, labelled *Lampronota accusator* by Desvignes; and I possess a couple of females captured by Piffard at

Felden, in Herts., and Capron at Shere, in Surrey, the latter being mixed, as this species doubtless often is, with *L. melancholica*. Haliday's *L. denticornis*, which is only doubtfully synonymous, was found by him in pine woods in Ireland during the autumn.

*Tribe*

## ACAENITIDES.

This Tribe consists of several aberrant genera, of which *Acaenitus*, *Arotes* and *Collyria* appear sufficiently closely related. Of the rest, *Coleocentrus* is intermediate between the *Pimplinae* and the Ophionid genus *Anomalon*, *Oedematopsis* might with more propriety be placed in the *Tryphoninae* and the two final genera are superficially like some of the *Hemite lini*. If relegated to the *Pimplinae*, all fall into the present Tribe on account of their elongate hypopygium, which entirely conceals the base of their terebra, and in many cases extends to or even beyond the abdominal apex. The first four genera are stout insects with elongate and incrassate hind legs, and short, subclaviform antennae; the next three are much smaller and more slender species with elongate, filiform antennae, often exceeding the body in length, and the legs normal and slender. The majority are rare and we know the economy of but two species with any degree of certainty.

*Table of Genera.*

- |       |   |                              |
|-------|---|------------------------------|
| (8).  | 1. Hind legs stout and elongate; antennae stout, about half length of body. |                              |
| (7).  | 2. Clypeus apically produced centrally; face not radiately strigose.        |                              |
| (6).  | 3. Areolet wanting; metathoracic spiracles linear.                          |                              |
| (5).  | 4. Head transverse; hind tibiae stout; hypopygium acuminate . . . . .       | ACAENITUS, <i>Latr.</i>      |
| (4).  | 5. Head subcubical; tibiae normal; hypopygium subtruncate . . . . .         | COLLYRIA, <i>Schiod.</i>     |
| (3).  | 6. Areolet triangular; metathoracic spiracles oval . . . . .                | COLEOCENTRUS, <i>Grav.</i>   |
| (2).  | 7. Clypeus apically truncate; face centrally radiately strigose . . . . .   | AROTES, <i>Grav.</i>         |
| (1).  | 8. Hind legs normal; antennae about as long as the body.                    |                              |
| (12). | 9. Clypeus as long as face and in ♀ tuberculate; terebra normal.            |                              |
| (11). | 10. Areolet wanting; abdomen coriaceous                                     | OEDEMATOPSIS, <i>Tschek.</i> |
| (10). | 11. Areolet present; abdomen not coriaceous . . . . .                       | DIADEGMA, <i>Morl.</i>       |
| (9).  | 12. Clypeus normal; terebra reflexed or incrassate centrally.               |                              |
| (14). | 13. Abdomen subpetiolate; legs and antennae elongate; areolet wanting       | THYMARIS, <i>Först.</i>      |
| (13). | 14. Abdomen sessile; legs and antennae short; areolet entire . . . . .      | APHANOROPTRUM, <i>Först.</i> |

**ACAENITUS, Latreille.**

Latr. Gen. Crust. et Ins. iv. (1809), 9.

Head transverse, subbuccate and not narrowed behind the oval and entire eyes; clypeus short and transverse, deeply and semicircularly discreted from the square face, with the apical margin subtruncate and centrally reflexed; mandibles longitudinally striate; apically bifid with the upper tooth the more obtuse; ligula exerted; antennal scrobes deeply impressed; genal costa inflexed. Antennae filiform, as long as or rather longer than half the body. Thorax stout and strongly convex, with notauli very distinct; mesosternum short, with indications of lateral sulci; metathorax short and rugose with indistinct areae, spiracles large and elliptic, of ♂ sublinear. Scutellum apically elevated and obtusely rounded, with erect pilosity. Abdomen smooth, as long as head and thorax, somewhat narrower and subcompressed apically, subsessile, convex and oblong, of ♂ more constricted and longer than in ♀; basal segment smooth and subcanaliculate, gradually dilated apically, narrower in ♂; sixth of ♀ ventrally concave and elongately acuminate; terebra from about half to fully length of body. Hind legs elongate and incrassate, with the tarsal claws large, curved and not pectinate; front tibiae unicalcarious. Wings with no areolet; the upper pair with basal nervure perpendicular and not curved, fenestrae large and nearly confluent; lower ones with the first recurrent postfurcal.

Gravenhorst calls attention to the relationship of this genus with *Lissonota*, *Coleocentrus*, *Arotes* and *Collyria*. It is, however, abundantly distinct from any of these and probably most closely related to *Lampronota*, though the superficial resemblance to the Braconidous genus *Helcon* is, as remarked by Haliday (Ent. Mag. 1836, p. 143), curiously striking.

*Table of Species.*

- |      |   |                     |
|------|---|---------------------|
| (2). | 1. Abdomen immaculate black; terebra shorter than abdomen . . . . .           | 1. ARATOR, Rossi.   |
| (1). | 2. Abdomen white-banded, centrally red; terebra longer than abdomen . . . . . | 2. DUBITATOR, Panz. |

**1. arator, Rossi.**

*Ichneumon arator*, Rossi, F.E. ii. 49. *Acaenites arator*, Gr. I.E. iii. 813; Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 8; Tasch. Zeits. Ges. Nat. 1863, p. 298; Voll. Schets. I, pl. iii, f. 5, ♂ ♀.

Black and shining. Head with short, black pilosity; palpi infusate, ligula stramineous; clypeus strongly bisinuate on either side; face strongly longitudinally impressed on either side below the scrobes, which reach the vertex and enclose a distinct frontal carina. Antennae about half length of the body, of ♂ very stout, strongly obtuse at apex and hardly

attenuate towards the base; infusate and broadly fulvous beneath, with the scape and basal flagellar joint, which is curved and nearly half as long again as the second, entirely black. Thorax gibbulous and immaculate; mesonotum trilobed to its base, strongly nitidulous laterally, centrally striate and anteriorly canaliculate in the centre; mesonotum and pleurae coriaceous; metathorax with all the areae entire, though very roughly defined; basal area broader than long and apically subexplanate; areola hexagonal, not longer than broad, emitting costulae from near its base; petiolar area glabrous, laterally impressed and centrally carinate longitudinally, its basal costa strongly curved. Abdomen slightly longer than head and thorax, subfusiform, laterally compressed, broadest centrally, entirely glabrous and nitidulous with only the first segment basally aciculate and bicarinate; third to sixth ventral ♀ segments spinately produced; terebra rather longer than half the abdomen. Legs stout and bright fulvous with the coxae, trochanters and extreme base of all the femora jet black; hind legs strongly incrassate, with tibiae and tarsi black. Wings large and distinctly clouded; stigma ferrugineous and peculiarly narrow; radix and tegulae black, the former often ferrugineous. Length, 9—13 mm.

It is said by Tosquinet to occur on the Continent from June to September; Gravenhorst took a male on *Umbelliferae* about Cudova, in Silesia, in August; Holmgren found it in flowers of *Pastinacea* and Brischke has bred it in Prussia from *Sesia formicaeformis*. There is a female in Marshall's collection in the British Museum from the Pyrenees, and a male from Desvignes'. I took a single male on a flower-table of *Angelica sylvestris* in Tuddenham Fen, Suffolk, in a very marshy spot, on 29th August, 1902; and have seen three others of the same sex captured by Chitty in Wicken Fen, Cambs., on 18th August, 1900. With us it would appear to be both rare and local.

## 2. *dubitator*, Panz.

*Ichneumon dubitator*, Panz. F. G. lxxviii. 14; Latr. H. N. xiii. 180. *Cryptus dubitator*, Fab. Piez. 85. *Acaenites dubitator*, Gr. I. E. iii. 810, ♀; Latr. Cuv. R. A., ed Masson, pl. cxii, f. 2; Tasch. Zeits. Ges. Nat. 1863, p. 298, ♂ ♀.

Black with the pleurae very closely and confluent punctate. Abdomen of ♂ rarely entirely black with only the apical segments narrowly whitish, but usually in both sexes with the second and third segments entirely fulvous, sometimes black-marked, apex of first generally and sometimes the fourth basally and laterally fulvous; the remainder margined with white or dull testaceous; basal segment a little longer than broad; the sixth and seventh spiniformly concave; terebra black and as long as the body with the spicula red. Legs fulvous with all the coxae and trochanters, together with the hind tarsi, black; hind tibiae generally ex-

ternally nigrescent. Wings flavescent, with the stigma infusate or ferrugineous; radix pale and tegulae black. Length, 10—12 mm.

Gravenhorst mentions a variety in which both sexes have at most the incisures of the second and third segments red, and the third to seventh or the whole of the seven basal segments margined with glaucous-white.

This species is very like *A. arator* in conformation, but the basal segment is shorter, the terebra longer, the thorax less coarsely sculptured and the abdomen rufescent or at least white-banded.

Panzer took it on umbelliferous flowers and Tosquinet says it occurs in July in Belgium. It was introduced as British by Rev. T. A. Marshall in his 1870 Catalogus but nothing whatever is known of its occurrence here.

### COLLYRIA, *Schiödde*.

Schiöd. Guér. Mag. Zool. 1839, Ins. p. 10.

Head cubical, with the eyes pilose and somewhat large; cheeks buccate, not elongate, with their costa sharply inflexed; clypeus hardly discreted, apically truncate and centrally produced. Antennae shorter than head and thorax; scape a little excised, flagellum basally subattenuate. Thorax elongate; pronotal epomia conspicuous above; notauli apically distinct; mesosternum elongate, with no lateral sulci; metathorax long with distinct longitudinal, but no transverse, costae; spiracles small and obliquely linear. Abdomen elongate and apically subcompressed; basal segment parallel-sided, with central spiracles; ventral valvulae not vomeriform, but covering the base of the short and straight terebra. Anterior legs slender; the hind pair strong and stout, their tibiae straight and longer than the incrassate femora, calcaria short, tarsi elongate with the claws and pulvilli stout. Wings with stigma narrow and no areolet; apical abscissa of radial nervure nearly twice longer than the basal; lower angle of discoidal cell subacute; fenestrae discreted and not small. Lower wings with the first recurrent very strongly postfurcal, intercepted far above its centre; second recurrent centrally pellucid.

This genus figures among the *Ophioninae* in all the British catalogues; but its stout and elongate hind legs, very indistinctly subpetiolate abdomen, cubical head, and the conformation of the mouth parts and antennae certainly ally it far more closely with *Acaenitus*, as was indicated by Thomson in 1877; and it appears to bear only a distant analogy with *Pristomerus vulnerator*, its cogeneric species in the Gravenhorstian system, which is a true Ophionid and closely related to *Cremastus*.

#### *Table of Species.*

- |      |  |                              |
|------|--|------------------------------|
| (2). | 1. Eyes densely pilose; vertex strongly and confluent punctate | 1. CALCITRATOR, <i>Grav.</i> |
| (1). | 2. Eyes sparsely pilose; vertex evenly, not confluent punctate | 2. PUNCTICEPS, <i>Thoms.</i> |

1. *calcitrator*, Grav.

*Ichneumon coxator*, Vill. Linn. Ent. iii. 193 (?). *Pachymerus calcitrator*, Gr. I. E. iii. 727; Ste. Ill. M. pl. xxxix, fig. 2; Curt. B. E. 624 et Farm. Ins. 257, cf. 253, pl. xxxvi, fig. 6; Voll. Schets. I. pl. ii, fig. 24, ♂ ♀. *P. trichophthalmus*, Thoms. O. E. viii. 734, ♂ ♀.

Head black with the mouth and apices of the equidentate mandibles dull ferrugineous and the palpi infusate; vertex dull, strongly and confluent punctate; eyes clothed with dense and somewhat elongate pilosity. Antennae pilose and not apically attenuate, infusate with the flagellum fulvous beneath. Thorax immaculate, deplanate; finely and not very closely punctate; metanotum with distinct pleural costae and a central basal carina extending to its centre; mesosternum shining and finely punctate throughout. Scutellum black and apically obtuse. Abdomen nitidulous and obsoletely punctate; black with apex of the first, the second and third except often a discal mark on the former, and base of the fourth segments, red; terebra about as long as basal segment. Legs black with the anterior tibiae and tarsi, front femora externally and the intermediate apically, red; hind legs, especially the coxae and basal joint of trochanters, elongate with the tibiae basally and tarsi beneath rufescent; front coxae punctate, posterior strongly nitidulous and subglabrous. Wings narrow and slightly clouded; stigma piceous, tegulae black, radix fulvifrons. Length,  $5\frac{1}{2}$ —9 mm.

The colour of the abdomen and hind legs is variable, tending to red in ♀ and black in ♂, which latter is slightly the larger sex.

Curtis in his article on the depredations in cornfields of the sawfly, *Cephus pygmaeus*, says "Providence has provided a remedy in a parasitic ichneumon, which is actively engaged in our corn fields in the destruction of the larvae of the *Cephus*, with which it has been found enclosed; and the parent fly must be endowed with surprising intelligence, for, as M. Dagonet justly observes, the deposition of the egg is an operation difficult enough, if one reflect that the ichneumon has not only, like the greater number of the *pupivora*e, to touch the skin of the larva but lightly, on which its progeny must be supported, but it has at first to satisfy itself of the exact spot in the stubble where the larva of the *Cephus* is to be found, so that at the same time it pierces the stalk it must reach the larva which is to receive its eggs" (Notices Entomologiques, p. 40; quoted by Curtis, Farm Insects, 256). Nothing appears to have been added since 1860 to our knowledge of the economy of this abundant species.

This is the commonest of our Ichneumonidae in cultivated lands, and may be constantly seen on the flowers of *Heracleum* and *Chaerophyllum* throughout the month of June, to which it is very nearly restricted in England. I have seen it in my garden at Monks' Soham as early as 23rd



May, and Mr. Adams has taken it at Lyndhurst as late as 2nd July. There are records of this species' occurrence as common in Norfolk (Curtis and Bridgman); Essex (Vict. Hist.); Guernsey and Alderney (Luff); Suffolk, Combe Wood, Darent, Dover and Battersea Fields (Curtis). I have seen it from Croydon (Brunetti); East Isley in Berks. (Hamm); Widmerpool, Notts (Carr); near Bedford (Lucas); and Ampton, West Suffolk (Nurse). I possess specimens from Felden, in Herts. (Piffard); Filton, near Bristol (Charbonnier); Tostock, in Suffolk (Tuck); Hastings and St. Leonards (Esam); Freshney Bogs, South Leverton and Mablethorpe (Thornley); Cadney (Peacock); Guestling, in Sussex (Bloomfield); Greenings (W. Saunders) and Shere (Capron), in Surrey; Totham, in Essex (Image); and Deal (E. Saunders). It has occurred to me abundantly at Mildenhall, Felixstowe, Nacton, Bentley Woods, Blakenham, Bawdsey and Ipswich, in Suffolk; Chippenham, in Cambs.; Filby Broad, in Norfolk; and at Godshill, Ningwood, Calbourne, and Norton Wood, in the Isle of Wight. I was very much surprised to find a female on the flowers of Angelica here as late as 29th August, in 1907; Curtis also found both sexes at the end of July.

## 2. puncticeps, Thoms.

*Pachymerus calcitrator*, Gr. I.E. iii. 727 et auctt. (part.). *P. puncticeps*, Thoms. O.E. viii. 734, ♂ ♀.

Black with the flagellum beneath, centre of abdomen and the anterior legs mainly pale; eyes clothed with sparse and short pilosity; the vertex of head and sides of the mesosternum shining and closely, but not confluent, punctate. Length,  $5\frac{1}{2}$ —9 mm.

A race of the preceding species differing in the above characters has been raised to specific rank by Thomson, though it is extremely improbable that it is more than an inconstant variety. It differs from *C. calcitrator* in the less profuse pilosity of the eyes, in the much smoother, more shining and evenly punctate vertex around the ocelli, in the narrower petiole, slightly longer terebra and hardly clouded wings.

This species has not before been noticed in Britain, but it doubtless occurs with frequency along with the last described. Tuck has taken them in company at Tostock, in Suffolk, Peacock at Cadney, in Lincs. and I at Mildenhall; it has also occurred to Beaumont at Blackheath, near London and to me at Lavenham, in Suffolk and Wicken, in Cambs. from 27th May to 14th June.

**COLEOCENTRUS**, *Gravenhorst*.

Gr. I.E. iii. 437, ♀; Thoms. O. E. viii. 732. *Macrus*, Gr. I. E. iii. 707, ♂ (1829).

Head transverse and subbuccate, eyes oval; cheeks not short, genal costa inflexed; clypeus short and discreted, apically produced in the centre; mandibular teeth subequal. Antennae filiform, shorter than body; of ♂ slender. Thorax subcylindrical; mesothorax laterally subquadrate, notauli deeply impressed and reaching centre of mesonotum, mesosternum not transverse with no lateral sulci, epicnemial obsolete; metathorax rugose with a few longitudinal costae only, spiracles distinct and oval. Scutellum triangular and strongly convex. Abdomen subsessile, convex, as broad as and twice longer than thorax, apically compressed; ♀ ventral valvulae acute and vomeriform; basal segment subequilateral and distinctly deplanate; the second and third with lateral oblique impressed lines and in ♂ the incisures broad and deeply impressed; seventh and eighth large and produced, anus subacuminate; terebra nearly as long as the body. Legs long and somewhat slender. Wings ample with areolet small, triangular and petiolate; upper wings with the lower basal nervure interstitial, the upper basal strongly oblique and not curved; radius emitted from before the centre of the narrow stigma, and longer basally than apically; fenestrae minute and broadly discreted; recurrent nervure hardly curved; lower wings with the first recurrent strongly postfurcal.

The head, thorax and legs resemble those of *Ephialtes*, but the abdomen and wings are more similar to those of certain Ophioninae.

This genus, a ♀ of which is figured by Ratzeburg (Ichn. d. Forst. iii. 94), was placed by Gravenhorst under *Banchus* and originally contained females only, since he erroneously placed the males in his Ophionid genus *Macrus*. They were united by Wesmael, in his "Notice sur les Ichneumonides de Belgique appartenant aux genres *Metopius*, *Banchus* et *Coleocentrus*" of 1849, where he states the opinion that they appertain rather to the Pimplinae. Thomson retains the genus in this position on account of the oblique incision of the basal segments, though indicating the affinity shown with the Ophioninae by the apically compressed abdomen.

**1. croceicornis**, *Grav.*

*Macrus croceicornis*, Gr. I.E. iii. 710, ♂. *Macrocoleus croceicornis*, Desv. Trans. Ent. Soc. 1850, p. 12. *Coleocentrus excitator*, Wesm. Bul. Ac. Brux. 1849, p. 633, excl. ♀ (*nec* Gr.). *C. croceicornis*, Holmgr. Sv. Ak. Handl. 1860, n. 10, p. 8; Tasch. Zeits. Ges. Nat. 1863, p. 296, ♂; Brisch. Schr. Nat. Ges. Danz. 1880, p. 108, ♀; Brauns, Mit. Schweiz. ent. Ges. 1888, p. 8, ♀. Var. *Macrus soleatus*, Gr. I.E. iii. 711, ♂.

Head large and subbuccate with the temples tumidulous, of ♀ immature, of ♂ with the palpi, labrum and facial orbits broadly flavous;

clypeus of ♀ apically obtusely bidentate. Antennae filiform and longer than half the body; of ♀ ferrugineous with the scape black, of ♂ croceous with the scape and basal flagellar joint black above and flavous beneath. Thorax gibbulous, of ♀ coarsely punctate; metathorax rugulose and apically bidentate, with the areola glabrous, sulciform and elongate; lateral areae wanting, though longitudinal costae distinct. Scutellum black and deplanate. Abdomen narrow, double length of head and thorax, laterally compressed towards the anus, black; of ♀ coarsely punctate with the four basal segments transverse and bearing lateral red lines before the apices, the basal segment rugosely punctate with a flat and abbreviated central furrow, and the hypopygium vomeriform; ♂ with basal segment subcanaliculate and apically red, the second to fifth except apical mark on the latter red, sixth laterally castaneous; terebra scarcely as long as the abdomen. Legs elongate and in ♀ entirely red; ♂ anterior legs flavescens with the trochanters above, coxae and femora fulvaceous, hind legs red with the tibiae apically nigrescent and the tarsi pale flavous with their basal joint dull ferrugineous; ♀ with the penultimate hind tarsal joint scarcely half the length of the apical, ♂ with the two apical joints of equal length. Wings normal, subhyaline; stigma dull fulvous, radix and tegulae subtestaceous; areolet irregular, small and elongately petiolate; lower wing with first recurrent intercepted nearly at its top. Length, 15—16 mm.

The ♂ var. *soleatus* has the face entirely flavous and the abdomen mainly red. The hypopygium of the ♀ is said by Brauns (*loc. cit.*) to be a good specific character and to be much less developed than in the two remaining palaearctic species. Viewed laterally, it is centrally explanate and apically constricted to an obtuse point, which in the others is acuminate; the lateral lines on second segment are also shorter.

Desvignes' single male is still extant in his collection in the British Museum; from it I took the above metathoracic sculpture, but it has not the apical hind tarsal joints of equal length. It has much the facies of *Anomalon*.

This species, though perhaps the commonest of the genus throughout Europe, appears to be everywhere rare. Gravenhorst took a single male near Gottingen, Boheman another in Sweden, Kirchner records it from Vienna and Hungary and it has not been found in Belgium since the capture of Wesmael's two specimens; nor does Dours mention it from France, and Brischke gives no details of capture respecting his Prussian female. It was introduced as British by Desvignes on the strength of a single male, given to him by Doubleday, nearly sixty years ago. This is the only indigenous example I have seen.

**AROTES**, *Gravenhorst*.

Gr. I.E. iii (1829), 446.

Head shortly transverse with the eyes oval; frons centrally and face radiately carinate. Antennae somewhat slender and shorter than the body; of the female white-banded. Thorax convex and cylindrical; notauli very deep; metathoracic area obsolete, basal area elongate, costulae emitted before centre; petiolar area transstrigose. Scutellum convex and triangular with its apex obtuse. Abdomen fusiform, subpetiolate, as long as or a little longer than the head and thorax, narrower than the latter and apically compressed; basal segment elongate and canaliculate, a little dilated towards its apex, with the postpetiole twice longer than broad and the lateral tubercles central; the second segment almost, and the remainder distinctly, transverse; sixth and seventh ventral segments of ♀ with the valvulae concave, vomeriform and produced beyond the anus; terebra as long as the body. Legs elongate; the anterior slender and the hind pair stout; hind femora produced beneath, tibiae arcuate; tarsal claws entire. Wings somewhat ample with the areolet wanting; second recurrent nervure is emitted by the cubital nearer the base than is the submarginal; basal nervure distinctly incrassate near the costa; nervellus strongly arcuate, subopposite and intercepting in the centre.

The strongly carinate frons, radiately strigose face, only centrally discreted clypeus, longer lower mandibular tooth, elongate metathoracic spiracles and basal area, the acuminate hypopygium, intumescent hind femora and peculiarly dentate claws, as well as the incrassate basal nervure and unusual position of the second recurrent nervure render this genus abundantly distinct.

Gravenhorst places it under *Banchus* and remarks upon the relationship of this genus with *Xorides irrigator* in the conformation of the head and basal segment, though the former is less globose; also in its anal, pedal and terebral construction with *Acaenitus*, "sed habitu toto naturali, et characteribus exhibitis conjunctim sumtis, *Arotæ* satis ab omnibus illis subgeneribus discerni possunt." Marshall in his 1872 Catalogue, for want of a better (since no intermediate author had referred to the subject) left this genus in the above position; but Ashmead in 1900, following Förster's nomenclature, very correctly transfers it to the *Acaenitini*. Few authors, however, appear to have been acquainted with it and I found it necessary to draw largely from the examples in the British Museum for the smaller and more important characters.

1. *albicinctus*, Grav.

*Arotes albicinctus*, Gr. I. E. iii. 448, ♂ ♀ ; Ste. Ill. M. vii. Suppl. 2, pl. xxxvi, fig. 4, ♀ ; Voll. Schets. I, pl. ii, fig. 18, ♀ .

♀. Head subquadrate and not narrowed behind the eyes; vertex somewhat dull with large and sparse punctures; frons strongly excavate, closely and coarsely punctate with a strong carina extending from the lower ocellus to the radiately strigose epistoma; face dull and coarsely punctate; clypeus not laterally discreted but strigose, centrally glabrous, apically punctate and truncate with a red dot on either side; mandibles stout, convex, red, basally strigose and apically black with the lower tooth rather the longer; palpi infusate with the two apical joints subcylindrical. Antennae black, filiform throughout, apically obtuse, with a six-jointed white band distinctly beyond the centre. Thorax immaculate; notauli very deeply impressed; metathorax indistinctly sculptured with the areae subcomplete; basal area very long, areola almost transverse and emitting the costulae from before its centre; petiolar area distinct, entire and strongly transstrigose; spiracles very large and strongly elongate, sub-linear. Scutellum black, deplanate, punctate with black pilosity and laterally bordered from the base to beyond its centre. Abdomen black with the apices of the basal segments more or less broadly flavous; basal segment subglabrous and nearly linear, only a little explanate apically with the spiracles before the centre and an inconstant discal fovea or canalication at its posterior third; anus strongly compressed, hypopygium very large, acuminate, ferrugineous and extending beyond anus; terebra as long as the body, with the spicula very fine, and the obsoletely pilose valvulae distinctly dilated before their castaneous and truncate apices. Legs black with the hind ones distinctly stout and elongate; anterior tibiae and front femora internally pale testaceous; front tarsi at the base, and their calcaria, curved; hind femora tuberculiformly produced beneath before their apices; the curved hind tibiae at their extreme base and the four apical joints of their tarsi white; tarsal claws strong and distinctly bifid internally in the centre, with obsolete pulvilli. Wings fulvescent with the stigma ferrugineous and tegulae black; areolet wanting; second recurrent nervure emitted from the internal cubital before the inner submarginal; nervure near stigma much thickened; nervellus strongly arcuate, subopposite and intercepting in the centre. Length, 15 mm.

♂ differs only in having the whole face, mouth and frontal orbits flavous; the antennae with no pale band; scape flavous, and flagellum testaceous, beneath; all the flagellar joints apically nodulose; postscutellum usually pale; and the areola quadrate.

The above description of this hitherto inadequately diagnosed species is drawn from eight specimens of both sexes in the British Museum, of

which one pair was taken by Smith in Darenth Wood and Colney Hatch Wood; one female by Heysham; one pair by Stephens, as recorded by him (I. M. Suppl.) "Many years since I once observed this fine, and apparently rare, insect, flying in plenty at Darenth Wood in June; I fortunately secured a pair. It is the only species of the genus"; there are also two males and one female from Desvignes' collection (*cf.* Entom. 1878, p. 157). Smith adds (Ent. Ann. 1859, p. 112) that Stephens took it "on the trunk of an oak at the entrance to Darenth Wood; on obtaining the knowledge of the locality, we proceeded a few days afterwards to Darenth; no sooner had we arrived at the spot pointed out, than on the identical oak a fine *Aroles* settled before us, and was immediately captured; the following season (about 1840) a second example was taken at Colney Hatch, since which we have not met with it until the present season (1858), when a third was captured near Lowestoft." Dr. Giraud tells us (Ann. Soc. Fr. 1877, p. 406) that Perris has bred this species from *Clytus arcuatus* in France.

### OEDEMATOPSIS.

*Oedemopsis*, Tschek. Verh. z.-b. Ges. 1868, p. 276; *lib. cit.* 1870, p. 430; *Oedimopsis*, Thoms. O.E. ix. 907; (?) *Hybophanes*, Först. Verh. pr. Rheinl. 1868, p. 216.

Head subglobose, eyes small, entire, shortly and sparsely pilose; frons convex, mandibles bidentate with the lower tooth the shorter; clypeus large and stout, apically broadly rounded or subtruncate, of ♂ nearly flat, as long as face and not broader than long, discreted with a basal fovea on either side and apically subreflexed, of ♀ semicircularly discreted basally, very strongly convex and produced with a fine transverse carina, intercepted by a conspicuous central subglobose tubercle, extending across its centre. Antennae slender, filiform and a little shorter than the body. Thorax stout and subovate with distinct notauli; metathorax longer than high, apically attenuate and produced above the hind coxae; upper and petiolar areas distinct; spiracles circular and situated between the centre and base. Scutellum deplanate and apically obtuse; its basal fovea multi-striate. Abdomen subpetiolate with the second and third segments strongly punctate-rugulose; of ♂ sublinear with all the segments longer than broad, the four basal of equal length, the two following longer than the apical, and the last bicarinate discally and narrowed apically; of ♀ linear-subfusiform with the three basal segments elongate and the remainder telescoped, apical ventral segment covering base of terebra, which is straight and not quite half the length of the abdomen. Legs slender with the tarsal claws simple. Wings of normal breadth with no areolet.

This genus differs materially from the *Xoridini* in its close-fitting mandibles, very large and not apically impressed clypeus, normally broad wings and shorter terebra.

Its position is still a moot point; though strictly speaking the subsesile, rough and deplanate abdomen, lack of all trace of areolet and distinctly exerted terebra, place it incontrovertibly in the *Pimplinae*, among which its cubical head and elongate legs ally it most closely with the *Xoridini*. Tschek says his genus is "a further contribution to the Austrian *Pimplidae*" and Bridgman (Entom. 1879, p. 129) "that it ought to remain among the *Pimplidae* and in Holmgren's section ii A a †" (*Xoridini*). Thomson, however, places it in his subtribe *Thymarides* of the *Tryphoninae* and no doubt can remain that, wherever placed, it cannot be separated from *Thymaris*, a genus of far less Pimplid facies. On the whole, I am inclined to think, with the last author and Gravenhorst, that, in spite of its cubical head and exerted ovipositor, it is a true Tryphonid and certainly not one of the *Lissonotini*, among which it is placed as synonymous with *Hybophanes* by Ashmead, who probably followed up Marshall's position for it at the end of *Phytodietus*. It is here treated in its strict and perhaps more unnatural position in the *Pimplinae*, which is further favoured by its ectoparasitic economy.

#### Table of Species.

- |      |    |   |                      |
|------|----|---|----------------------|
| (2). | 1. | Metanotal carinae weak; thorax discally black .. .. . | 1. SCABRICULA, Grav. |
| (1). | 2. | Metanotal carinae strong; thorax discally red .. .. . | 2. OPS, Morl.        |

#### 1. scabricula, Grav.

*Tryphon scabriculus*, Gr. I. E. ii. 180, ♂. *Oedematopsis Rogenhoferi*, Tschek, Verh. z.-b. Ges. 1868, p. 276, ♀; *lib. cit.* 1870, p. 430, ♂ ♀. *O. scabriculus*, Brisch. Schr. Nat. Ges. Danz. 1878, n. 6, p. 76; Voll. Pinac. pl. xxxii, fig. 1. *Phytodietus scabriculus*, Bridg. Entom. 1878, p. 36, ♀; *cf. lib. cit.* 1879, p. 129, ♂ ♀. *Oedimopsis scabricula*, Thoms. O. E. ix. 907, ♂ ♀.

Punctate, black, entirely stramineous beneath. Head with the mouth except apices of mandibles, cheeks, clypeus, face, and all the orbits broadly, stramineous. Antennae basally pale beneath, of ♂ fulvo-ferrugineous, of ♀ usually with a variable band beyond the centre. Prothorax except discally, the whole sternum, lower part of the pleurae, broad and elongate lines before radix, sides and apex of scutellum and the postscutellum, flavous; notauli and sternauli half length of mesothorax; metathorax rugose with five indistinct areae and the petiolar area very short. Abdomen black, usually with the incisures, especially the apical ones, and all the ventral segments in life, glaucous-white; second and third segments, and apex of the aciculate and bicarinate first, scabriculous, remainder smoother; terebra a little longer than the basal segment, stout and distinctly incrassate beneath before the centre. Legs flavous, or in life luteous, with the apical tarsal joint, extreme apices of the hind femora

and tibiae infusate; hind tibiae slightly intumescent and infusate before the base; basal joint of front tarsi arcuate, their femora not spinose. Wings with radix and tegulae flavous. Length,  $5\frac{1}{2}$ — $8\frac{1}{2}$  mm.

Bridgman (Entom. 1879, p. 129) gives three ♀♀ and two ♂♂ slight varieties of this species, which may be tabulated:—

Spiracles of basal segment not projecting.

Antennae with joints 14—18 white .. .. No. 1, ♀.

Antennae with no joints white above .. .. No. 2, ♀ and 4, ♂.

Spiracles of basal segment strongly projecting;

Antennae of ♀ with joints 17 and 18 alone white No. 3, ♀ and 5, ♂.

No. 1 has the basal segment explanate from base to apex, in No. 2 the width is variable, No. 3 has the postpetiole subparallel-sided. In No. 4 the second segment is nearly twice longer than broad and in No. 5 only a little longer. No. 3 and 5 have the abdomen and especially the basal segment more coarsely punctate and constitute a form perhaps distinct from No. 1 and 4, the former of which (that figured by van Vollenhoven) differs from No. 2 only in the lack of a flagellar band. No. 5 is said to be the form described by Gravenhorst. All the forms are common with us, No. 3 perhaps the least so.

The only other species of this genus, *O. limbata*, Thoms., is a ♀ which agrees with the above in its subglobose head, tumidous cheeks, large epomiae, length of the notauli, elongate mesosternum and areola, short and laterally spinate petiolar area; but differs in its recurrent nervures, in having all the segments apically stramineous and no flagellar band. It is probably no more than the second of the above varieties.

The larva of *O. scabricula* was first observed by Bridgman, who says (*in lit.* to Marshall) “Mr. W. H. B. Fletcher sent me some young larvae, he says no doubt of *Tortrix costana*, with external parasites on them; each one had a small larva fastened to the *Tortrix* larva at the neck and laid across the back. In a few days the larvae grew restless and began to spin about, and at length spun an enclosing web between the cork and neck of the bottle. The parasite then cast its skin; the web was accidentally torn and they fell to the bottom of the bottle. I thought they might want to burrow, so I took out the old food and put in some soil. But in opening the half dead leaves of the food, I found one of the larvae which had not been disturbed four times the size of those which had fallen out of the webs, and quite filling the webs. So it seems when the ichneumon larva wants to shed its skin, Nature prompts the host to spin a surrounding web; the ichneumon larva is then able to take hold of the host again and suck it dry, the latter half of the process being evidently done in a few days, as after the web is spun the host seems listless and somewhat shrunken, whereas they were very restless just before it. *Paniscus* and *Mesochorus* are quite different in their habits.” I give the above account verbatim to avoid error and because nothing whatever has



been published concerning the economy of this species; the host-larvae were from Mundham, and the only parasite which survived emerged in July, 1886.

In September, 1901, Mr. H. J. Charbonnier sent me from Bristol a ♀ of this species, with immaculate antennae, saying it "results from a small lepidopterous larva, name unknown, which we found here in May, with an ichneumon larva attached like a sort of collar round its neck, between the second and third segments." A rough sketch of Bridgman's places the parasite in about the same position. "The parasite was very firmly attached and extended three-quarters or a little less round his victim's neck. The lepidopterous larva was very active and did not seem at all inconvenienced." He also sent the parasite's cocoon, which is still attached to the host's web and the dead host-larva, of which only the shrivelled skin remains, still with the skin of the parasitic larva attached. The cocoon is not remarkable; it is white with a browner tint than the web, externally rough and cottony, internally smooth and shining, cylindrical, thrice longer than broad and  $3\frac{1}{2}$  mm. in length.

I am obliged to Dr. Chapman for the following amplification of the above notes on the economy of this interesting species (*in lit.* 20th March, 1907). "Some *Tortrix* larvae (possibly those of *T. pronubana*—cf. E.M.M. 1906, p. 12) on *Euonymus*, sent from Herne Hill by Mr. Rayner, had external parasites. The larvae were three in number and were received February 25th, 1907. The parasites were one to each larva, on one side of the thorax in an incision and were about one millimetre long, transparent whitish, like hymenopterous larvae, head downwards and almost underneath. On March 5th they had grown nearly two millimetres long, curled round the side of the larvae, with the head ventral or almost round on the other side. In one case the parasite was in the 1—2 thoracic incision, in the other in the 2—3 incision with the head attached between the legs of the larva, the tail of the parasite almost on the larval dorsum. There were now only two *Tortrix* larvae, the third with its parasite having been eaten by the others or one of them, only a portion of its head being discovered. The two remaining larvae were then separated and placed in a temperature of 75F. and were not looked at till 8th March, when the progress made was astonishing. There were now no *Tortrix* larvae but two ichneumon cocoons, each containing a pupa of the parasite. The cocoon of very transparent but close textured silk was about 10 mm. long and rather wide and roomy, the pupa inside about 6.5 mm. long and very active when disturbed, with the eyes already brown. The cocoon contained a black-brown spot—? faeces—at the end, and also the skin cast when pupating. The remains of the *Tortrix* larva are brown and shrivelled, about 3 mm. long and have attached the cast skins of the parasites, in precisely the position and of about the size when seen on March 5th.

It would appear, then, that the parasite moulted when still only some 2 or 2.5 mm. long and completed the destruction of the larva by attacking it in a fresh place and sucking it dry, the greater part of its growth now taking place. It could not well have another moult, as the time seems too short for a moult, feeding up, spinning a cocoon, changing to pupa and—as the brown eyes suggest—already making some further development. The empty skins still attached to the remains of the larvae are not shrivelled but stand out in some degree in natural position. On soaking larva and mounting, the remains of *Tortrix* larva are found to be complete as regards skin, etc., so that feeding has only been done by suction. The larva of parasite appears to have been free, or nearly so, in its last instar. The cast skin mounted shows a series of heads, the final—really penultimate—of this series at one end is still attached to the larval skin and three others, at fairly regular distances, along the concave margin of the skin, against the *Tortrix* larva. The fourth—earliest and smallest—close to what may be really the eggshell; the latter, if so, is quite transparent. All these heads seemed to be attached to the dead larva; the process of moulting was obviously for the larva to leave the old skin where it was, advance the front segments so that the new head could take a fresh hold, the later segments still occupying the old skin, but of course advanced forwards within it, as the larva was lengthened and the old skin as it was cast (not as described by Newport, etc.) shoved back, but simply maintaining its place and the grown larva extended forwards. The skins are very puzzling at first, with a great excess of spiracles of various sizes and ages, *viz.* those of all the four skins. This method of growing accounts for the larva being at first lateral and finally with its head ventral; it perhaps also accounts for the number of larvae in excess dying, probably being seized and sucked by their brethren, whose positions imply their doing so. On March 15th, 1907, two ♀♀ emerged; they were six millimetres in length, both had broadly white banded antennae and the abdomen of one is slightly distorted; both lived in confinement till 22nd March.

On 15th March, 1907, Mr. Sich found larvae of *Capua angustiorana* feeding on box in Kew Gardens; two of these had external parasites; in one



case the parasitic larva was lying across the caterpillar's back between the meso- and meta-thoraces and in the other it was between the 2nd and 3rd abdominal segments. The hosts did not attempt to dislodge them. Neither attained full growth and

were reduced to little more than empty skins before the parasites spun silken cocoons which produced this species, a ♀ on 13th May and a ♂ a day or two later.

Brischke claims to have bred the male from larvae of *Cladius difformis* and, van Vollenhoven says, Dr. Wittewaall raised it in Holland, from the "chrysalis" of a willow-feeding *Tortrix*; it is recorded by Fitch (Entom. 1883, p. 67) from *Endopisa leplastriana*, a *Tortrix* on *Myrica gale* and galls of *Andricus terminalis*; and I possess a male bred by Miss Alderson on 2nd April, 1903, from forced *Tortrix Forsterana*, at Worksop.

*O. scabricula* appears local or periodical in its appearance; it was very common in 1900, but I have hardly seen it since then; it is usually taken by sweeping the tops of herbage in the middle of June, though it may be found from that time to the middle of September. It was erroneously recorded by Dale (E.M.M., p. 68) as new to Britain in 1893—we find it in Desvignes' Catalogue—and as occurring as Glanvilles Wootton (E.M.M. 1903, p. 100); not uncommon in Norfolk, at Brundall and the Heigham osier carr, in July and August; taken at light in Worcester by J. E. Fletcher on 30th July, 1876; and bred—as noted above—by W. Fletcher from *Tortrix costana* (Bridgman); Exminster, Exeter and Bickleigh, in July and September (Bignell); Hastings (Bloomfield); Finborough Park, in Suffolk (Tuck); Hastings and Abinger Hammer, near Guildford (Butler); Weybridge and Blackheath (Beaumont); Felden in Herts. (Piffard); Shere, in Surrey, common (Capron); Tarn Lodge, near Carlisle (Routledge); and Worksop (Houghton). I took it at Ipswich in 1894, commonly in June at Barton Mills and Tuddenham Fen, in Suffolk and a few females in August at Lyndhurst, in the New Forest.

## 2. Ops, sp.n.

A beautiful species, with the thorax mainly red. Head hardly narrowed behind the eyes; vertex convex and coarsely punctate, with a large stramineous spot at each orbit; clypeus (conformed exactly as in the last species), face, mandibles, cheeks and palpi pale stramineous throughout. Antennae filiform, somewhat slender and shorter than the body, obscurely rufescent basally beneath; tenth to twelfth flagellar joints white. Prothorax badius, with its basal lateral suture and an elongate line before the radix white; mesothorax entirely red, dull, closely and distinctly punctate; metathorax dull and rugulose, black with the pleurae red; its costae strong with the areae entire; areola a little longer than broad, emitting costulae from its centre; basal areae distinct, petiolar subvertical and spiracles circular. Scutellum and postscutellum dull, clear red. Abdomen a little explanate in the centre with the segments not elongate, black, pilose, dull and coriaceous punctate; base of the first, and extreme apices of the anal, segments pale; basal segment more shining, strongly punctate, broadly explanate throughout with the discal carinae parallel, weak, distinct, extending to near apex and enclosing a glabrous line; ventral margins of all the segments and the central plica flavous; terebra one-third the length of

the abdomen, stout and apically subattenuate. Legs entirely fulvous with the anterior coxae and all the trochanters white, the hind tibiae and their tarsal joints apically slightly infusate. Wings hyaline; radix and tegulae white; stigma luteous; nervellus wanting. ♀ only. Length, 5 mm.

Much as I dislike describing a new species from a single example, the present insect is so distinct, bearing only a somewhat remote superficial resemblance to *Polysphincta Bohemani*, that it is well, I think, to put it on record.

I have seen but one female, which was captured by Dr. Capron, presumably in the neighbourhood of Shere in Surrey, about 1880. The type is in my collection.

### DIADEGMA, m.

? *Diadegma*, Först. Verh. pr. Rheinl. 1868, p. 153.

Head distinctly transverse, with the temples not broad; eyes nude and very prominent; occiput bordered and not emarginate; face closely shagreened, dull and longitudinally subimpressed on either side the slightly convex epistoma; clypeus broader than long, distinctly discreted basally, a little rounded and depressed apically, strongly convex with a central transverse furrow on either side which is discally intercepted by a small tubercle. Flagellar joints elongate and cylindrical. Notauli fine and deeply impressed, sternaui entire and very strong, specular furrow reaching centre; metathorax convex and dull with complete areae; basal area triangular and as long as the subpentagonal areola which emits the costulae slightly beyond its centre and is apically entire; petiolar area flat, discreted, reaching centre, with strong and obtuse apophyses; spiracles circular. Scutellum flavous and subconvex. Abdomen fusiform, compressed only at the apex; first segment basally narrow, explanate throughout, shagreened with a small fovea before the glabrous apex, laterally bordered with the spiracles distinctly behind the centre; segments finely pilose and not tuberculate; terebra distinctly exerted and as long as the basal segment. Legs elongate and slender, with the claws simple; front femora not spinose, their calcaria and basal tarsal joint strongly arcuate; hind tibiae subincrassate before the base, their tarsi white-banded. Wings ample; areolet large, transverse-pentagonal, with the outer nervure pellucid; nervellus normally curved, stigma not broad; upper half of second recurrent nervure, and the internal cubital broadly before its apex pellucid; median of hind wing distinctly curved before the nervellus, which is strongly antefurcal and intercepted far below the centre.

The above characters are drawn from an anomalous female in my collection, which has much the facies of a *Hemiteles*, but the peculiarly broad areolet which is externally complete, its resemblance to *Thymaris*, and the

structure of the clypeus which so closely corresponds with that of *Oedmatopsis*, conduce to the opinion that it is best placed, at least tentatively, under *Diadegma*. I must own, however, that Förster's meagre diagnosis of this genus is quite unintelligible to me and I simply adopt the name because such points as he indicates are possessed by my insect, and I am not aware that any species have before been described under this genus.

### 1. *anomala*, sp.n.

Head black with short grey pilosity; palpi, extreme apex of clypeus, cheeks, a subtriangular facial mark, and the internal orbits to ocelli broadly, white; remainder of mouth and face ferrugineous. Antenne infusate, with the scape rufescent beneath. Thorax dark red or badius, with fine grey pilosity, mesonotum black; pronotum and propleurae, callosities before and beneath radix and beneath hind wings, lateral marks on metathorax and the dentiparal areae, flavous. Scutellum flavous. Abdomen entirely brunneous, with the apices of the second and seventh segments flavous, and of the remainder rufescent. Legs dark red with the hind femora brunneous; anterior coxae and trochanters entirely, apex and a large mark before base of the hind coxae above, and the three central joints of the hind tarsi, white. Wings hyaline with the stigma ochraceous and radix flavidous. ♀. Length, 7 mm.

As I have remarked above, this species is somewhat incongruous wherever it may be placed. The subpetiolate abdomen, broadly pentagonal areolet and position of the petiolar spiracles ally it with the *Cryptinae*, irregular areolet, elongate legs and apically compressed abdomen with the *Ophioninae*; and it has as much relationship with the *Tryphoninae* as has *Thymaris*, to which it, in spite of the areolet, appears most closely associated.

I possess only a single female, kindly presented to me by Mr. Stanley Edwards, who took it at Lynton, in Devonshire, in 1890.

### THYMARIS, Förster.

Verh. pr. Rheinl. 1868, p. 151; *Thymarus*, Thoms. O. E. ix (1883). 908.

Head as broad as the thorax, circularly narrowed behind the eyes, with the vertex only slightly broader than long; clypeus arcuately discreted, subconvex and apically very slightly rounded; eyes densely and very finely pilose, prominent, large and extending to base of mandibles, which are weak and apically narrowed with the lower tooth the smaller; cheeks short and not buccate; face of ♀ anteriorly contracted. Antennae nearly

as long as body, unusually slender with the flagellum filiform and scape compressed-globose. Thorax with the epomiae rising nearly to the mesonotum; notauli somewhat elongate but not deeply impressed; mesosternum not transverse, flat, with sternauli long and not deep; metathorax mutic and not rugose, with complete areae; areola hexagonal and emitting costulae before centre; spiracles circular. Abdomen apically subcompressed; basal segment elongate, discally subconvex, nearly thrice longer than apically broad, aciculate throughout with only the petiolate base smooth and spiracles slightly behind the centre; second segment quadrate and, at least in ♀, aciculate; third finely alutaceous beyond the centre, remainder glabrous; terebra centrally incrassate and distinctly exerted. Legs very slender with the hind coxae oblong; hind tibiae slightly incrassate before the base; front femora not spinose, the basal joint of their tarsi a little arcuate. Wings with no indication of an areolet; radius very slightly curved and emitted from the centre of the normally broad stigma; basal nervure hardly curved or oblique, and slightly divergent from the cubital; parallel nervure emitted far below centre of the brachial cell; nervellus antefurcal and intercepted far below the centre.

This genus must be retained in juxtaposition to *Oedematopsis*, with which it so closely agrees in its more salient features, although the body is more slender, the abdomen smoother and the head less cubical. It was originally placed by Förster in the *Ophioninae* and Bridgman considered it a division of *Cymodusa* in that sub-family; Thomson, however, discovered the obvious relationship of the above-named genus with it, and includes them, under the group-name *Thymarides*, in the Tryphonid *Meso-leptina*, I think correctly; but Ashmead in 1900 widely separates these two genera by leaving the present in its original position and placing *Oedematopsis* in the *Pimplinae*. Both sexes bear a curious superficial resemblance to small *Microcryptus* or the more slender *Hemiteles*, and the aciculate abdomen is similar to that of *Panargyrops*.

The only other palearctic species, *T. collaris*, Thoms., is not unlikely to occur with us.

#### Table of Species.

- |      |    |   |                                  |
|------|----|---|----------------------------------|
| (4). | 1. | Second segment distinctly aciculate throughout. |                                  |
| (3). | 2. | Coxae pale; flagellum of ♀ tricoloured          | 1. PULCHRICORNIS, <i>Brisch.</i> |
| (2). | 3. | Coxae mainly dark; flagellum of ♀ unicolourous  | 2. FENESTRALIS, <i>Morl.</i>     |
| (1). | 4. | Second segment not aciculate; ♀ unknown         | 3. FASCIATA, <i>Bridg.</i>       |

### 1. *pulchricornis*, *Brisch.*

*Thymaris pulchricornis*, Brisch. Schr. Nat. Ges. Danz., 1880, p. 145, ♂ ♀.  
*Thymarus compressus*, Thoms. O.E. ix. 909, ♂ ♀.

A black species, with somewhat badius abdomen and pale legs. Head shining and pubescent, hardly narrower than the thorax, with the facial orbits impressed; palpi and mouth testaceous; clypeus concolorous, normal and transverse, basally subtuberculate in the centre, apically a little rounded and not depressed. Antennae very slender, with the scape rufescent; flagellum of ♀ tricoloured, black with the four basal joints red and the eleventh to fifteenth white, of ♂ longer and infusate throughout or basally rufescent. Thorax shining and pubescent; areola longer than broad, parallel-sided, basally rounded and apically truncate, emitting the costulae near its base; basal area not short. Abdomen with the apical margin of the second and often third segments dull testaceous; basal segment longer than the hind coxae and trochanters, aciculate, slender and centrally impressed; the second almost longer than broad, dull and finely aciculate; the quadrate third and the following shining; anus stramineous; terebra as long as or slightly longer than the basal segment. Legs dull testaceous, hind ones in ♀ rufescent; coxae and trochanters pale; hind tibiae basally paler and apically subinfusate. Wings of normal breadth; radix flavous and tegulae fulvous; stigma of ♂ infusate. Length, 5—6 mm.

The descriptions leave no room for doubt that Brischke's and Thomson's species are synonymous.

*Thymarus compressus* is recorded as a new British Tryphonid by Bridgman (Trans. Ent. Soc. 1887, p. 373 and—by an oversight—1889, p. 433) on the strength of specimens taken and determined by Dr. Capron in the neighbourhood of Shere in Surrey; these were one male and two females, which are now in my own collection. They are the only recorded specimens in this country, though I do not anticipate that the species is rare with us, having been found in Scandinavia and Prussia; more especially as I took the male at Brandon on 9th June, 1903, by beating a pine tree, and the female on 8th August, 1902, by sweeping some heath grass beneath pine trees in a sandy lane at Tuddenham Fen; both specimens were caught in Suffolk and appeared attached to *Pinus sylvestris*. On 14th June, 1907, I swept a third female from bracken on the borders of Wilverley Enclosure, in the New Forest.

### 2. *fenestralis*, sp.n.

A small black species with only the clypeus, mandibles and palpi stramineous; the anterior legs, except the intermediate coxae, testaceous; and the hind tibiae basally whitish; the three basal segments very finely

and closely aciculate throughout, with their apices usually pale. ♀ only. Length,  $3\frac{1}{2}$ —4 mm.

In all other respects this small species resembles *T. pulchricornis*, especially in having the apices of the three basal segments more or less distinctly pale, the anus flavidous, the hind tibiae basally constricted and the terebra centrally incrassate; but the unicolourous flagellum, aciculate third segment and small size will instantly distinguish it.

I have met with it nowhere but on the windows of Monk's Soham House, in Suffolk, where it has occurred to me upon several occasions in June, August and September. It occurs along with *Hemiteles cingulator* and both appear to emerge from within the house, most probably bred from *Anobium domesticum*, *Corynetes caeruleus*, or some other of our household insects.

### 3. *fasciata*, Bridg.

*Thymaris fasciatus*, Bridg. Trans. Ent. Soc. 1886, p. 348, ♂.

Head subbuccate and not contracted behind the finely pubescent eyes; clypeus apically rounded, mandibles centrally red and face normally pubescent. Thorax black, with the mesonotum smooth and shining; mesopleurae dull, finely punctate and apically rugulose; metathorax with the lateral areae subobsolete, "the lower half with fine transverse rugae"; areola apically incomplete, petiolar area transversely rugose and centrally very slightly impressed. Abdomen finely pubescent, black with the apical margin of the second, a band slightly beyond the centre of the third and more obscurely of the fourth segments, red; basal segment slender with the postpetiole parallel-sided, distinctly impressed transversely just behind its centre, nearly twice longer than broad and about double the width of the petiole; third segment rather longer than broad and the remainder transverse. Legs slender; the anterior pale red with the coxae, base of trochanters and of femora black; apices of the intermediate tibiae and of their tarsi infusate; hind legs black with the calcaria, apex of trochanters, centre of tibiae and extreme base of tarsi fulvescent. Wings basally pale; tegulae black, stigma ochraceous; areolet wanting. Length, 7 mm.

Bridgman brought forward this species among the *Ophioninae*, as having no connection with *Thymarus* and his description differs from the present genus in the following particulars, which he enumerates:—The space between the eyes and base of mandibles about as broad as the latter, the teeth of which are of equal length; areola pentagonal and rather broader than long; the second segment twice longer than broad and the nervellus not intercepted.



A single specimen is said (*loc. cit.*) to have been captured by Mr. Thouless, in Norfolk, in 1884; and its author adds (Trans. Norf. Soc. 1893, p. 618) that this was found "in the neighbourhood of Norwich. It is the only specimen I have seen of this genus taken in England." I know of no other records and the female is still unknown.

### APHANOROPTRUM, Förster.

Först. Verh. pr. Rheinl. 1868, p. 168; *Aphanoroptra*, Thoms. O. E. viii. 736.

Head oblong-ovate and rostrately produced towards the mouth, with the cheeks somewhat elongate and their costae continuous; vertex narrow, frons not convex, centrally canaliculate and impressed above the scrobes; clypeus indistinctly discreted and labrum elongately exerted; mandibles short, broad and margined with the apical teeth obsolete and of equal length. Antennae filiform, not longer than half the body, apically obtuse with the scape hardly excised. Thorax gibbous with the pronotal epomiae large; notauli short and somewhat deeply impressed; mesosternal sulci laterally deeply impressed and posteriorly bifurcate; metathorax short, apically truncate with the areae entire and strongly costate; spiracles round and approximating the base. Scutellum laterally margined and apically foveate. Abdomen very closely punctate; apices of the segments not elevated nor nitidulous; basal segment broad and laterally margined with its discal carinae convergent and extending nearly to its apex; second and third segments very obsoletely tuberculate; seventh small and retracted; hypopygium vomeriform and distinctly extending a little beyond the anus; terebra curved and distinctly exerted. Legs not slender, somewhat short with the onyches minute and simple. Wings with the stigma broad and triangular; radial cell broad, discoidal with its lower angle acute and a little longer than the brachial; areolet entire and irregularly triangular; basal nervure acutely sinuate; nervellus strongly antefurcal and intercepting far below the centre.

Thomson remarks upon the relationship set up between this genus and *Tryphon* by the conformation of the metathorax, petiole and hypopygium.

#### 1. ruficornis, Grav.

*Lissonota ruficornis*, Gr. I.E. iii. 98, ♀; cf. Tasch. Zeits. Ges. Nat. 1863, p. 290 et Schm. Opusc. Ichn. 1329. *Pimpla abdominalis*, Gr. I.E. iii. 150; Tasch. Zeits. Ges. Nat. 1863, p. 62; Brisch. Schr. Nat. Ges. Danz. 1880, p. 114, ♀; Bridg. Trans. Ent. Soc. 1881, p. 166, ♂ & ♀. *Aphanoroptra ruficornis*, Thoms. O.E. viii. 736.

Head finely punctate throughout; palpi piceous or rufescent; face not convex but obsoletely canaliculate on either side. Antennae red, porrect, filiform not longer than half the body, of ♂ somewhat longer and darker;

with the scape, and in ♀ two or three basal flagellar joints, black. Thorax gibbulous and immaculate; metathorax evenly and not very closely punctate, with the basal area wanting; areola pentagonal, apically truncate and emitting the costulae from a little before its centre; petiolar area vertical and not discreted. Scutellum immaculate. Abdomen ovate-cylindrical, slightly longer than the head and thorax and as broad as the latter, finely punctate; basal segment gradually explanate throughout, nearly twice longer than broad, canaliculate and black with the apex, like the remainder of the abdomen, red; second segment sometimes transversely impressed before its apex; ♂ with all the segments more or less indeterminately infusate, at least centrally; terebra half length of abdomen, black with the spicula red. Legs testaceous red with the coxae and trochanters, except the apices of the latter, black; posterior femora broadly black in the centre; hind tarsi of ♂ subinfusate. Wings somewhat short, slightly clouded; stigma and radius testaceous, radix and tegulae red with the latter broadly black basally; areolet sessile. Length, 6—7 mm.

This species appears to be rare or local on the Continent and few authors make mention of it. There can, I think, be but little doubt respecting the correctness of the synonymy here adopted, since the two descriptions of Gravenhorst agree almost word for word throughout, though it is strange that he should twice refer to so distinct an insect. Thomson places the former in this genus, which he beautifully delineates, but he does not synonymise it with *Pimpla abdominalis*. Schmiedeknecht allows *Lissonota ruficornis* to remain in its original genus as an insufficiently defined species. It is abundantly distinct from the genus *Pimpla*, in which it so long stood, by the protuberant hypopygium and strongly costate metanotum.

As far as I am aware it is only recorded from Volhynia and Warmbrunn, on umbelliferous flowers in August by Gravenhorst; from Sweden by Thomson; and from Insterburg in Prussia by Brischke. As Bridgman remarks (*l.c.*) it was taken with us by Dr. Capron in the neighbourhood of Shere in Surrey in 1880, and from these the former first described the male; these specimens of both sexes are now in my collection and no one appears to have since met with it in Britain, though there is a single ancient female from Stephens' collection in the British Museum. It has hitherto been nowhere bred.

## BANCHIDES.

In spite of all that has been written by Holmgren and Thomson to the contrary, I am certainly of opinion that this aberrant group of Ichneumons bears features of closer relationship with certain Pimplinae than with the Ophioninae or Tryphoninae. On the one hand they resemble *Acaenitus* in the subsessile abdomen, narrow wings and elongate legs, and, on the other, their relationship with *Meniscus* is well attested by Gravenhorst, who described the same insect, under different names, in both groups. The rhomboidal areolet and subsessile abdomen exclude them from the Ichneumoninae and Cryptinae; the lack of a distinct petiole also will not permit of their inclusion in the Ophioninae; and the distinctly exerted ovipositor of at least *Exetastes* seems to preclude them from the Tryphoninae, wherein the anus is never distinctly compressed as in *Banchus*, though this feature is met with to a modified extent in the Acaenitides. Marshall places *Arotes* between our two British genera of this tribe, from which, however, it so materially differs in conformation as to be far more naturally included in the last tribe. Our genera are easily distinguished:—

- |      |    |   |                         |
|------|----|---|-------------------------|
| (2). | 1. | Eyes internally emarginate; onyches pectinate . . . . . | BANCHUS, <i>Fab.</i>    |
| (1). | 2. | Eyes not emarginate; onyches simple                     | EXETASTES, <i>Grav.</i> |

### BANCHUS, *Fabricius*.

Fab. E.S. Suppl. (1798), 209.

Head shortly transverse, a little narrower than the thorax and constricted behind the subreniform-oval and always internally emarginate eyes; clypeus subdiscreted and apically emarginate; mandibular teeth obtuse and unequal; maxillary palpi with the fourth joint of ♂ often strongly dilated, of ♀ a little incrassate; frons strigose between the scrobes. Antennae somewhat slender, subfiliform with the scape deeply excised; longer in ♂. Thorax convex; notauli elongate and, at least posteriorly, entire; metathorax short and scabrous with no arcae; apophyses stout and sometimes connected by a central carina; spiracles linear. Scutellum triangular and apically obtuse, gibbous or convex, nearly always with a more or less acuminate discal spine. Abdomen sessile or subsessile, smooth and nitidulous, longer and usually narrower than the thorax, dorsally convex and laterally compressed especially in the ♀; basal segment hardly broader apically, slightly canaliculate, with the lateral tubercles before the centre; anus of ♂ obtuse with segments five to seven very short, of ♀ segments five to eight usually elongately exerted; terebra not or hardly exerted. Legs elongate and not unusually stout,

their tarsal claws pectinate. Wings somewhat narrow, usually subfulvescent; areolet always entire, very large and irregularly subrhomboidal; stigma not small; radial cell lanceolate with its lower side much curved.

The species constituting this genus have the peculiar power of emitting a pungent odour, which is very happily compared by Ratzeburg (Forst. i. 104) to that of an alarmed ants' nest.

Some confusion was at first caused in this genus by Gravenhorst, who transposed the sexes; this error was, however, rectified by Ratzeburg in 1844 and Wesmael in his "Notice sur les Ichneumonides de Belgique appartenant aux genres *Metopius*, *Banchus*," etc., satisfactorily classified four of our species in 1849. The genus is remarkable in its large rhomboidal areolet, discally spinate scutellum and the varying conformation of its maxillary palpi, on account of which a distinct genus, *Corynephanus*, was erected for one of its species by Wesmael.

#### Table of Species.

- |      |   |                               |
|------|---|-------------------------------|
| (8). | 1. Scutellum distinctly spinate discally.                       |                               |
| (3). | 2. Hind coxae strongly and sparsely punctate beneath            | 1. VARIEGATOR, <i>Fab.</i>    |
| (2). | 3. Hind coxae finely and closely punctate beneath.              |                               |
| (7). | 4. Scutellar spine short and stout; palpi apically cylindrical. |                               |
| (6). | 5. Hind femora more or less infuscate                           | 2. PICTUS, <i>Fab.</i>        |
| (5). | 6. Hind femora entirely clear red                               | 3. VOLUTATORIUS, <i>Linn.</i> |
| (4). | 7. Scutellar spine long and slender; palpi apically clavate     | 4. MONILIATUS, <i>Grav</i>    |
| (1). | 8. Scutellum mutic or hardly tuberculate                        | 5. FALCATOR, <i>Fab.</i>      |

The only other species of this genus described by Gravenhorst, *Banchus (Arenetra) tomentosus*, has been relegated to a position in the *Pimplides* since 1858; Schmiedeknecht, however, considers it correctly here retained.

#### 1. *variegator*, *Fab.*

*Ichneumon variegator*, *Fab.* S.E. 339; *Banchus variegator*, *Fab.* Piez. 128, ♂. *Ichneumon compressus*, *Fab.* E.S. ii. 180; *Banchus compressus*, *Fab.* Piez. 129, ♀; *Gr.* I. E. iii. 377; *Ratz.* Ichn. d. Forst. i. 104, pl. vi, fig. 3; ii. 87; iii. 93; *Wesm.* Bul. Ac. Brux. 1849, p. 631; *Holmgr.* Sv. Ak. Handl. 1858, n. 8, p. 148; *Thoms.* O.E. xxii. 2411, ♂ ♀.

Somewhat shining, with fuscous pubescence. Head subbuccate behind the eyes, black; of ♂ with the face except centrally, mouth and orbits, of ♀ with the internal and external orbits only, flavidous; palpi cylindrical with the second joint explanate and the apical thrice longer than broad; clypeus, palpi and apices of mandibles pale. Antennae ferrugine-

ous with the scape and base of flagellum black. Thorax variable in colour, usually with two humeral marks, a callosity beneath the radix, an arcuate petiolar fascia and sometimes dots above the coxae, more or less distinctly flavidous; mesopleurae coriaceous. Scutellum entirely or laterally flavous, with a very short and stout discal spine. Abdomen nitidulous, elongate-fusiform and laterally compressed with segments one to seven, or in ♀ one to four, with broad apical fasciae; first segment obsoletely punctate with basal tubercles. Legs fulvescent-flavidous with the coxae, base of trochanters, more or less of the femora, and often apices of the hind tibiae infusate; coxae strongly and sparsely punctate beneath. Wings fulvescent-hyaline with the stigma fulvous, radix and tegulae flavidous, the latter often black-marked; areolet broad and subsessile. Length, 14 mm.

The only British ♀♀ I have seen belong to Gravenhorst's var. 2, which has the thorax and scutellum entirely black, though sometimes with a pale callosity beneath the radix; the abdomen, too, has at most the segments narrowly white apically.

This species may easily be known among those with cylindrically jointed palpi by its smaller scutellar horn, coriaceous mesopleurae, paler abdominal bands and, especially, by the deeply and sparsely punctate hind coxae. The external nervure of the areolet is, as pointed out by Bignell (Trans. Devon. Assoc. 1898, p. 495), distinctly shorter than in *B. pictus*.

Ratzeburg bred this species from *Noctua piniperda* and *Bombyx auriflua* in Germany; but the only British records I can find are Bignell's from Shaugh Bridge in Devonshire at the end of May, and Harwood's from Colchester in the Vict. Hist. Essex. The Rev. F. D. Morice took it at Ripley early in June; I possess a typical male found at Trench as early as the 3rd April, 1893, by Martineau; a female captured flying on the sandhills at Saltfleet, Lincs., in June by Musham; and another bred by Porritt in June, from *Trachea piniperda* at York.

## 2. *pictus*, Fab.

*Banchus pictus* Fab. E. S. Suppl. 234; Don. B.I. xii, pl. 413, figg. 1 et 2; Gr. I.E. iii. 380, excl. synonym.; Wesm. Bul. Ac. Brux. 1849, p. 631, excl. var. *totus niger*; Thoms. O.E. xxii. 2411, ♂ ♀.

Head subbuccate behind the eyes, black; face except centrally, centre of mandibles and sometimes frontal dots, flavous. Antennae ferrugineous or piceous, usually with the scape flavous, and the following joints more or less testaceous or ferrugineous, beneath. Thorax black; two marks on the front of the mesonotum, a line beneath the radix, a perpendicular one on the mesopleurae, lateral marks on metathorax and in the petiolar

area, sometimes also a line beneath the hind radix and on pronotum, flavous. Scutellum and more or less of the postscutellum flavous; former with an erect, acute and sometimes black, spine. Abdomen black with all the segments broadly flavous-banded and the last generally entirely flavous. Legs pale; the finely and closely punctate coxae, base of the trochanters, and more or less of the femora, black; apices of tibiae and tarsi ferrugineous. Wings fulvescent; stigma fulvous and tegulae flavous. Length, 11—13 mm.

Extremely closely allied to the last species, with which it has been much mixed in our collections; thereform Thomson says it may be distinguished by the mesopleurae being finely and closely punctate and not coriaceous, by the larger scutellar spine, and more profuse decoration of the head and thorax; he also instances the finer coxal puncturation, which in certain specimens is very marked, but does not appear to me to be a constant character, as certainly is both the larger scutellar horn, the longer and more curved external nervure of the areolet and, perhaps, the much paler apices of the hind tibiae.

This is a very common species with us and we have a long list of localities, some of which should doubtless be ascribed to *B. volutatorius*. It was first noticed in Britain by Donovan, who figures it well early in the last century; Hope sent it to Gravenhorst from Netley in Shropshire, and the latter says it occurs on umbelliferous flowers in August. Brischke, who bred it from *Panolis piniperda* in Prussia, tells us that the cocoon is similar to that of *B. volutatorius*. There is a specimen bred from *Pygaera bucephala* in the York Museum; and Bignell has raised it in the middle of March from, probably forced, *Selenia illunaria* in South Devon (Buckler and Entom. 1881, p. 141). Dr. Wratislaw found it about Bury St. Edmunds (*in col.* Chitty); and Curtis says (B.E. 588) that it occurred to him on flowers in woods in Suffolk in May. Bradley took it at Colwich, near Birmingham (E. M. M. 1896, p. 165) and Dale at Middlemarsh and Parley Heath in Dorset. It has been bred by Gir from *Smerinthus populi* and Perris from *Trigonophora empyrea* (Ann. Soc. Fr. 1877, p. 406). Morice has captured it at Ripley and Long Cross in June; and Johnson at Churchill in Co. Armagh (Irish Nat. 1904, p. 256). I have seen examples from Whauphill in Wigtonshire sent by Gordon; Folkestone by Stanley Edwards; Colwich and Wyre in May and June by Martineau; Guestling near Hastings by Rev. E. N. Bloomfield; and Brockenhurst in June by Cross. It has occasionally occurred to me in the Bentley Woods near Ipswich, between 26th April and 31st May, flying in the afternoon about three inches above the grass and buttercup-leaves (looking very like *Crabro cribrarius*) and occasionally settling on some fallen tree trunk or log.

### 3. *volutatorius*, Linn.

*Ichneumon volutatorius*, Linn. F.S. 400, ♂. *Banchus falcator*, var. 1, Gr. I. E. iii. 388, ♂. *B. monileatus*, var. 1, Gr. lib. cit. 394, ♀. *B. pictus*, Zett. I.L. 391, ♂ (*nec* Grav.). *B. volutatorius*, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 149; Thoms. O.E. xxii. 2413, ♂ ♀; cf. Brisch. Schr. Nat. Ges. Danz. 1880, p. 198.

Somewhat shining, punctate, black. Head subbuccate behind the eyes; face flavous with a central longitudinal black line; mouth, all the orbits, the three basal joints of the maxillary palpi, sometimes the cheeks and a centrally acute frontal fascia, flavous; the two apical joints of the maxillary palpi, of which the penultimate is strongly explanate, and whole of the labial palpi, black; external orbits always pale. Antennae black with the scape flavous and the flagellum dull ferrugineous beneath. Thorax black with, in ♂, the anterior margin of the pronotum, two often large marks on front of the mesonotum, a callosity beneath all the radices and a large perpendicular mark on the mesopleurae, flavous; apophyses obtuse. Scutellum of ♂ flavous with a small stout fulvous spine, of ♀ black with the spine rufescent. Abdomen of ♂ flavous with the base of the segments dorsally narrowly and laterally broadly black, of ♀ black and centrally red or badious; basal segment not broad, very finely and closely punctate and, behind the prominent spiracles, subsinuate. Legs fulvescent with the base of the anterior, and whole of the hind coxae, black; apices of the hind tibiae and the tarsal joints nigrescent; coxae finely and closely punctate beneath. Wings fulvescent with the stigma, radix and tegulae flavidous or rufescent; areolet broad and sessile. Length, 9—11 mm.

Holmgren, who first identified the Linnean species with *B. pictus*, Zett. (*nec* Grav.) says it differs from *B. falcator* in its smaller size, distinct scutellar spine, somewhat longer and rather narrower basal segment of the abdomen, which latter is less compressed and more strongly obtuse apically in the ♀ and, in ♂, has the intermediate segments basally black. It is much more closely allied to *B. pictus*, with which I mixed it (cf. E. M. M. 1903, p. 158), but may be at once known from both that species and *B. variegator* by the distinctly explanate penultimate palpal joint.

It has not before been noticed in Britain.

Brischke says (*loc. cit.*) that he bred it in Prussia from *Hadena porphyrea* and that the cocoon is "lang elliptisch, schwarz, mit erhöhter, zuweilen hellerer Mittelzone." Mr. Evans has, I believe, taken this species at West Linton in the middle of July. On 25th May, 1899, I received a male from Christy, which had just emerged from West Sussex *Dianthaccia* sp., and in 1907 a ♀ bred from an unknown Lepidopterous host by Clutten at Burnley. I also possess it from Bewdley and Cannock (*ex col.*

W. Ellis); the New Forest (Miss Chawner); Ravenscar in Yorks, in August (Col. Bingham); and Derbyshire (Jourdain), but have not myself met with it. I have also recently seen it from Bradford, in Yorks (*cf.* Bradf. Sc. Jour. 1908, p. 71), and Woking, in Surrey.

#### 4. *moniliatus*, Grav.

*Banchus monileatus* [sic], Gr. I. E. iii. 393, excl. var. 1; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 149; Thoms. O.E. xxii. 2413, ♂ ♀. *Corynephanus monileatus*, Wesm. Bul. Ac. Brux. 1849, p. 631, ♂. ? *Banchus hastator*, Curt. B. E. 588 (*nec* Fab.).

♂. Black and nitidulous. Head hardly buccate behind the strongly emarginate eyes; frons not strigose between the margined scrobes; face and clypeus, except a longitudinal line on former and the basal angles of the latter, stramineous; mandibles concolorous with the unequal teeth black; the red maxillary palpi reaching to apex of the laterally subspinose mesosternum, their second joint stout and slightly arcuate, the third and fourth elongate-linear and apically clavate and black, fifth minute circular and black. Antennae black, as long as the body, stoutest a little before their apices; scape and base of first flagellar joint rosy, and the flagellum beyond its centre ferrugineous, beneath. Thorax finely and closely punctate, black with the mesopleurae and sternum broadly stramineous in front; metathorax short, apophyses subacute with their intermediate carina nearly entire; spiracles linear. Scutellum black and strongly convex with a deflexed and acuminate spine, nearly as long as its total length, projecting over the postscutellum. Abdomen immaculate; two basal segments strongly nitidulous, the remainder duller and pubescent. Legs elongate, red with the coxae, base of the hind trochanters, apices of their tibiae and the whole hind tarsi black; anterior coxae apically stramineous; hind tarsal claws apically red and pectinate. Wings silaceous; tegulae, radix and stigma infusate, radius basally ferrugineous; areolet rhomboidal, subsessile with the external nervure somewhat curved.

♀. Head with the maxillary palpi, mandibular marks and the margin of the clypeus, red; external orbits flavous. Antennae more slender apically, shorter than the body, apically curved and dull rufescent toward the base. Thorax gibbous. Scutellum with an erect and ferrugineous spine. Abdomen hardly longer than the head and thorax, subfusiform, ventrally and laterally compressed throughout, apically more slender and less obtuse than in the ♂; basal segment thrice longer than broad, subparallel-sided with the prominent spiracles a little before the centre. Legs elongate, fulvous; coxae, base of trochanters and apices of the hind tibiae black, their tarsi infusate. Wings slightly infumate, darker than those of the ♂; stigma ferrugineous, radius and radix and stigma red; areolet sessile. Length, 10—12 mm.



Both sexes, which I describe separately since I only know the ♂, are abundantly distinct from all the other species of this genus on account of their palpal conformation, upon which Wesmael erected the genus *Corynephanus*; he appears, however to have overlooked the minute apical, joint, since he says "leur dernier article, fort grêle, est brusquement renflé à l'extrême bout."

Brischke describes the cocoon as black and shining. It is 15 mm. in length and  $5\frac{1}{2}$  mm. broad in the centre, which is distinctly more convex on the side whence the imago escapes by cutting away a very large and irregularly circular hole, hardly reaching to the apex. This hole is not gnawed round at once, since strips of the cocoon 4 mm. long and  $\frac{1}{2}$  mm. broad are found attached to the white and shrivelled skin of the larva at the extremity of the cocoon furthest from the hole. The cocoon itself is composed of several layers, which become stouter externally. The outer integument is black and somewhat shining, though rendered duller than it otherwise would be by the beautiful network of fine threads interwoven by the larva; it is apically more obtuse and centrally much less cylindrical than that of *Exetastes cinctipes*.

This species is probably uncommon in Britain, and it has only been recorded from three localities. Harwood has found it about Colchester, Dale at Portland and Bignell has bred it on 4th June in south Devon from *Anarta myrtilli* (cf. Marshall, Ent. Ann. 1874, p. 125); specimens bred by Bignell from *Trachea piniperda* and recorded by Buckler were exhibited at a Meeting of the S. Lond. Ent. Soc. in March, 1890. On the Continent it is said to occur on umbelliferous flowers in June; and Brischke bred both sexes in Prussia from the pupae of *Hadena ballica*. The male described above was sent me by Mr. Haggart from Galashiels on 18th of July, 1901; it had emerged in transit and had gnawed some of the enclosing cotton-wool into its cocoon but had not itself emerged, though it did so instantly and with great velocity on being unpacked; its first attention was an elaborate palpal toilet. Curtis took a single female of his *B. hastator*, which I am not persuaded is synonymous with the present species, at Darenth in June. Buckler also records it from *Chaerocampa porcellus* on Adkin's authority.

### 5. *falcator*, Fab.

*Banchus venator*, Fab. Piez. 126; Zett. I. L. 391, ♀. *B. falcator*, Fab. Piez. 128, ♂; Gr. I. E. iii. 385, excl. var. 1; Latr. Cuv. R. A. ed. Masson, pl. cxi. fig. 3; Ratz. Ichn. d. Forst. i. 106; Wesm. Bul. Ac. Brux. 1849, p. 631; Holmgr. Sv. Ak. Handl. 1858, n. 8, n. 148; Thoms. O. E. xxii. 2412, ♂ ♀. *B. volutatorius*, Zett. I. L. 391, ♀ (*nec* Linn.). *B. Farrani*, Curt. B. E. pl. dlxxviii, ♀.

Head black; of ♂ with the external and most of genal and frontal orbits broadly, scrobes, a mark on the frons, and the mandibles except

their apices, flavous; of ♀ with usually the external and sometimes the internal orbits flavous or, like the mouth, ferrugineous. Antennae nigrescent, more or less red beneath; of ♂ with the scape flavidous beneath, and the following joints testaceous. Thorax black; of ♀ usually with a pale line beneath the radix; of ♂ with two marks on front of mesonotum, a transverse and an often confluent perpendicular line beneath the front radices and generally another perpendicular one beneath the hind radices, flavous, usually also the metathorax has more or less of the petiolar area and a mark above the hind coxae flavous. Scutellum flavous with a more or less distinct apical infusate tubercle or in ♀, entirely ferrugineous or black. Abdomen black; of ♀ with all the segments more or less badius; of ♂ with segments two to four, apex of first broadly, the remainder at least apically, and the venter basally, flavous. Legs fulvescent or red; coxae and trochanters partly, and the hind tibiae and tarsi apically, black; ♂ with the anterior and rarely the hind coxae and trochanters flavous. Wings fulvescent with the stigma fulvous; radix and tegulae of ♂ flavous, of ♀ fulvous; areolet broad, subsessile with the outer nervure distinctly curved. Length, 12—16 mm.

The submutic scutellum, which is rarely a little produced though not elevated at the apex in the ♂, is very characteristic of this species; and with the immaculate femora and centrally immaculate ♂ abdomen, will at once separate it from the remainder of the genus.

The colouration varies considerably, especially that of the ♂ thorax and ♀ abdomen. Of the former the whole anterior half of the mesonotum is often flavous with but a narrow central black streak, but frequently with the metathorax immaculate; more usually the latter is centrally flavous. The ♀ abdomen varies from all black to mainly red on the disc.

Brischke describes the cocoon as "elliptisch, in der Mitte etwas verdickt, derb, schwarzbraun."

The larva, which lives within that of *Geometra piniaria* and other species of the same group, is elongate, fleshy, smooth, extremely finely rugose and white; the head bears distinctly defined mouth parts; its length is seven lines. When full fed it evacuates its host and constructs for itself an elongate elliptic, deep black, parchment-like cocoon, which is externally uneven, rough and felted. In order to emerge it bites an elongate hole close to the apex of the cocoon (Bouché, *Naturg. Gartenins.* p. 154 *et* *Zust.* p. 146).

This is certainly the commonest species of the genus, though in my experience local and confined to the coast, where it abounds on umbelliferous flowers: it is probably the *Ichneumon umbellatarum* of Schrank. It was first taken in Britain by Hope, who sent it from Netley in Shropshire to Gravenhorst. The latter tells us it is found in meadows from June to September, and he saw many males flying about *Pinus sylvestris* in June;

these were doubtless attracted by *Geometra piniaria*, from the larvae of which this species has been bred in Germany. In Britain it is said to be not uncommon at Glanvilles Wootton, by Dale; taken by Dr. Capron near Guildford (Entom. 1880, p. 88); at Bickleigh Wood in Devon, at the end of May, by Bignell; about Colchester by Harwood; in Alderney in 1899 by Luff; in Aldercarr Wood in Notts., in July, by Prof. Carr; to be not uncommon about Norwich by Bridgman; and plentiful at the Devils Ditch in June and on whitehorn hedges at Stetchworth, in Cambs. (Vict. Hist. Cambs). Piffard has sent it to me from Felden in Herts; Hamm from Tubney, near Oxford; Sparke from Tuddenham Fen, Suffolk, in June; Col. Bingham from Ravenscar in Yorks, and Tuck from Bury St. Edmunds in July; it appears much rarer in August, when Wainwright took two males at West Runton in 1900. It has only occurred to me about Southwold on the Suffolk coast, at Reydon and Easton Bavents, and always on the flower-tables of *Heracleum sphondylium* and *Daucus carota* in July; it has always been abundant there since I first observed it seven years ago, especially in the most windy situations on the top of the cliffs; the dates vary from the 9th to the 26th of the month, and I could find none there this year in early September. This species flies onto the *Heracleum* flowers with very little hesitation, and feeds with its head down and abdomen erected on the long hind legs; they may easily be taken in one's fingers if a dart be made at them, but if their wings be not settled in repose they take flight at the least alarm; they often fall through the table of the flower and fly away from below it, not hiding there like *Cap-sidae*. If only slightly disturbed they will stand motionless for a minute and a half, with antennae stretched forward and, even on resuming their repast, they are keenly on the alert. They nearly always affect the tallest flower-heads and, when frightened, give off a pleasant odour, resembling that of a barber's shop. It has been bred, according to Buckler, from both *Chaerocampa porcellus* and *Dasychira fascelina*. Curtis records his *B. Farrani*, from the sandhills near Roundstone and Kinnordy, in Ireland.

### EXETASTES, *Gravenhorst*.

Gr. I. E. iii (1829), 395.

Head short and transverse, somewhat produced in front, not buccate posteriorly and often white-marked; clypeus subdiscreted, a little broader than long, more or less impressed, basally elevated and apically rounded but not excised; mandibles broad, curved, subconstricted apically with the teeth nearly of equal length; maxillary palpi simple; eyes entire and not emarginate. Antennae slender filiform or subsetaceous with the scape ovate and apically hardly excised. Thorax somewhat narrow; epinemia

distinct; metathorax stout, usually parallel-sided and dorsally scabriculous; areae obsolete or wanting; spiracles oval and not large. Scutellum mutic; convex or gibbous, especially when not pale. Abdomen narrow, subsessile and subcompressed at the apex, smooth and nitidulous; petiolar spiracles a little before the centre; second and third segments margined; terebra distinctly exerted. Legs slender, the hind pair elongate; posterior tibiae bicalcarate with the tarsal claws simple. Wings normal, often clouded; areolet irregularly rhomboidal; radius emitted slightly before the centre of the stigma, nervelet usually distinct; hind wings with the nervellus intercepted above the centre and the first radial abscissa only half the length of the second.

Thomson points out (O. E. xxii. 2414) that this genus is separable from *Banchus* by its entire eyes, which though not uniform in shape are never emarginate, the subentire scape and mutic scutellum; the external orbits are not flavidous, the mandibles have the upper tooth obliquely truncate and somewhat longer than the lower and the areolet, though large and rhomboidal, is yet smaller and seldom sessile; the recurrent nervure of the hind wing intercepts the radius in its first third and is shorter and slightly oblique. He adds that several of Gravenhorst's species probably belong to a distinct genus in the *Lissonotides*.

No attempt has hitherto been made to tabulate the species of this genus in a natural manner. Both Thomson and I have drawn up a colour scheme to facilitate identification (*cf.* E. M. M. 1903, p. 158); but a study of such material as I have at hand convinces me that good structural features exist, though somewhat obscure and difficult to tabulate. No uncertainty, however, should remain if both the following methods of determination be employed.

*Table of Species.*

- |       |   |                            |
|-------|---|----------------------------|
| (18). | 1. Basal segment at least twice longer than apically broad.     |                            |
| (15). | 2. Petiole discally glabrous.                                   |                            |
| (6).  | 3. Mesonotum finely punctate, subglabrous and less convex.      |                            |
| (5).  | 4. Hind femora immaculate red; metapleural costae less distinct | 1. CINCTIPES, <i>Retz.</i> |
| (4).  | 5. Hind femora at least apically black; costae more distinct    | 2. NIGRIPES, <i>Grav.</i>  |
| (3).  | 6. Mesonotum strongly punctate, shortly pilose and more convex. |                            |
| (14). | 7. Metanotum not longitudinally canalliculate in the centre.    |                            |
| (9).  | 8. Frons closely punctate and dull; areolet subsessile          | 3. GUTTATORIUS, <i>Gr.</i> |
| (8).  | 9. Frons centrally sparsely punctate; areolet petiolate.        |                            |
| (11). | 10. Nervelet extending to near centre of cubital cell           | 4. FEMORATOR, <i>Desv.</i> |

- (10). 11. Nervelet short or obsolete.  
 (13). 12. Thoracic pubescence black .. .. 5. LAEVIGATOR, *Vill.*  
 (12). 13. Thoracic pubescence subtestaceous .. 6. AETHIOPS, *Grav.*  
 (7). 14. Metanotum centrally longitudinally  
 canaliculate .. .. 7. FORNICATOR, *Fab.*  
 (2). 15. Petiole distinctly punctate.  
 (17). 16. Petiole sparsely and not finely punctate .. .. 8. CALOBATUS, *Grav.*  
 (16). 17. Petiole closely and finely punctate .. 9. MAURUS, *Desv.*  
 (1). 18. Basal segment only slightly longer  
 than apically broad .. .. 10. GRACILICORNIS, *Gr.*

### A Colour-Table of the Species.

- (2). 1. Hind metatarsus clear red .. .. 1. CINCTIPES.  
 (1). 2. Hind metatarsus infusate or black.  
 (8). 3. Scutellum apically or entirely white.  
 (7). 4. Callosity beneath radix not pale.  
 (6). 5. Abdomen mainly red .. .. 3. GUTTATORIUS.  
 (5). 6. Abdomen entirely black .. .. 9. MAURUS, ♂.  
 (4). 7. Callosity beneath radix pale .. .. 10. GRACILICORNIS.  
 (3). 8. Scutellum black.  
 (12). 9. Anterior femora mainly black.  
 (11). 10. Hind femora sanguineous-red .. 4. FEMORATOR.  
 (10). 11. Hind femora black .. .. 2. NIGRIPES.  
 (9). 12. Anterior femora red, sometimes basally  
 infusate.  
 (20). 13. Abdomen black.  
 (19). 14. Hind coxae black.  
 (18). 15. Stigma nigrescent or ferrugineous.  
 (17). 16. Hind tibiae apically infusate .. 7. FORNICATOR.  
 (16). 17. Hind tibiae entirely infusate .. 6. AETHIOPS.  
 (15). 18. Stigma testaceous .. .. 9. MAURUS, ♀.  
 (14). 19. Hind coxae red .. .. 8. CALOBATUS.  
 (13). 20. Abdomen mainly red.  
 (22). 21. Central hind tarsal joints infusate .. 5. LAEVIGATOR.  
 (21). 22. Central hind tarsal joints white .. 2. Var. ILLUSOR.

### 1. cinctipes, Retz.

*Ichneumon atrator*, Forst. Nov. Spp. Ins. 84, ♀; cf. Gr. I.E. iii. 903 (?). Geer, Mem. ii. 849, pl. xxix, ♂ ♀. *I. cinctipes*, Retz. Ins. 168, ♀; *Exetastes cinctipes*, Thoms. O.E. xxii. 2414, ♂ ♀. *Ichneumon osculatorius*, Fab. M.I. i. 261; *E. osculatorius*, Gr. I.E. iii. 413, ♂. *Ichneumon clavator*, Fab. E.S. ii. 151; *Ophion clavator*, Fab. Piez. 134; *E. clavator*, Gr. I.E. iii. 405, ♀; Voll. Pinac. pl. xvii, figg. 3, ♂ ♀. *Ophion tarsator*, Fab. Piez. 134, ♀; *Tryphon tarsator*, Zett. I.L. 386; *E. tarsator*, Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 150, ♂ ♀.

A black and slender species with the metatarsus always, and most of the ♂ abdomen, red. Head somewhat narrowed behind the eyes; face evenly and distinctly punctate; ♂ with the palpi testaceous and basally infusate, the mandibles except their infusate teeth, the face and cheeks, flavous; clypeus shagreened and deplanate with a few scattered punctures and the apex subtruncate, of ♂ flavous and of ♀ rarely badius. Antennae setaceous and about as long as the body with the basal flagellar joint nearly

twice longer than the second; of ♂ with the scape usually pale beneath, of ♀ with eight or nine of the central joints white. Thorax narrower than the head, punctate and somewhat nitidulous; of ♂ with a line before, and another transversely beneath, the radix and sometimes two pectoral marks, flavous; metathorax dorsally evenly subrugulose throughout with no trace of areae nor petiolar costa; spiracles linear. Scutellum distinctly punctate and black, of ♂ apically nearly always flavidous or white; postscutellum basally bifoveolate. Abdomen glabrous and nitidulous, black; in ♀ immaculate, in ♂ with the apex of the basal segment sometimes castaneous, the second and third usually mainly red, the fourth black and nearly always with its base rufescent, its ventral plica pale testaceous; basal segment slightly curved and gradually dilated apically with the postpetiole nearly twice width of petiole; second and third segments of about equal length; terebra half length of basal segment. Legs slender, pale red with the finely punctate coxae and trochanters black, or in ♂ with the anterior flavidous beneath; tarsi always red, with the three central joints of the hind ones stramineous; anterior tarsi of ♀ infusate. Wings hardly clouded and not broad, with the narrow stigma rufescent; tegulae of ♂ flavidous or ferrugineous, of ♀ piceous; areolet sessile, nervellus intercepted far above the centre. Length, 8—12 mm.

Among several hundreds of this species, which I have bred, the variation is surprisingly small. In both sexes the second to fourth hind tarsal joints are normally white, rarely flavous after death, and occasionally with the base of the fifth concolourous; the extent of sessility of the areolet varies somewhat and it is sometimes subpetiolate; the nervelet is also of variable length and often obsolete. The ♂ has the scutellum usually flavous at its apex, sometimes the apical half or the whole scutellum except its base is flavous, at others it is subobsoletely binotated with flavous at its extreme apex or entirely black; the antennae, which normally bear no pale central band, occasionally exhibit more or less distinct traces of one and very rarely the band is quite evident; the mesonotum is laterally flavous in typical examples, but sometimes more or less castaneous, this colour reduced to mere dots or rarely entirely wanting; the mesopleurae, generally in part flavous, are sometimes immaculate; the pronotum is occasionally flavous or bimaculate; the abdomen is never quite black, though the extent of the rufescent colouration is very variable; the femora are very rarely infusate, almost always pale at their extreme base, which is rarely quite white. The ♀ varies very slightly in having the usually entirely black abdomen rufescent at the thyridii and apical margin in the second segment; and its intermediate femora are almost always nigrescent towards their base.

It will, however, be found that the clear red basal hind tarsal joint will at once distinguish this species from all others of its genus.

The larva (first described by me in E.M.M. 1903, p. 163) is ovate, deplanate, curved and primrose-yellow; it consists of fourteen segments, of which the cephalic alone bears distinctive markings; the lateral lobes throughout the body are discreted by a more or less distinctly impressed line above and beneath, and bear concolorous spiracles. There appear to be no palpi nor prolegs. The cephalic segment is coriaceous; the antennae are represented by two smooth and hardly darker tubercles, behind each of which, at the inner orbit of the eye, is a semilunar area of the same colour and glabrosity. The eyes, in the fully fed larva, are represented by two subcutaneous purple patches at the upper lateral base of the cephalic segment. Two oblique and linear impressions run down from near the antennae to the apex of the clypeus, which is piceous and extends laterally to the bases of the mandibles; the labrum, except at its circular apex (between the apices of the mandibles), is not infuscate. The mandibles are very distinct, broad and subquadrate, margined with piceous colouring; at the upper apex of each is an acuminate, slender, nigrescent tooth; their bases are dark and corneous, extending some distance backwards. The labium is subtriangular, situated in a subrectangular impression below the centre of the mandibles. Length, 12 mm. The perfect insects usually emerge the following year; but two, received in October, 1901, were still healthy larvae in May, 1903.

The cocoon is described by DeGeer—whose imaginal description of both sexes is particularly lucid; but his fig. 11 is poor, representing the petiole as distinct, the abdominal segmentation much too pronounced and resembling that of *Mesostenus obnoxius* (cf. I.B. ii. 260)—as oval, black and shining. No one seems to have noticed it since but Brischke, who says it is similar to that of *E. fornicator*. It is about 16 mm. in length and  $4\frac{1}{2}$  in breadth, cylindrical, with the apices of equal size and broadly rounded; the outer envelope is very stout, black, externally somewhat dull and smooth with but faint indications of threads, internally it is glabrous and strongly nitidulous; within this and connected with it in no way is a second cocoon, testaceous-brown with a slightly paler central band, of much thinner and more flimsy consistency, resembling gold-beaters-skin; and within this again is a third, also detached and only slightly paler and thinner than the second, envelope; over the outer side of the third is a fourth entirely free one which, however, covers but one half of it (presumably the anal half, in which the pupal liquid is contained). I have seen examples in which the second envelope was constructed in two distinct sections, overlapping but unconnected, around the centre (pointing, probably, to the conclusion that these ichneumonidous cocoons are built in two halves, from either extremity in turn, and finally connected around the middle, which is so often of a paler colour than the remainder). Within the innermost cocoon the larva spins no means of attachment but, on the contrary, has certain powers of muscular locomotion. The imago

effects its escape through a subcircular hole, a little on one side of the apex; if, however, through lack of oral fluid, etc., it is unable to emerge, it reverses its position in the cocoon (probably in the hope of finding the other extremity more malleable), protrudes its tarsi from the incomplete orifice, and invariably dies in this position. After cutting its way through all its envelopes, the imago rushes out at a great pace, with its wings already quite fully developed and usually capable of instant flight, though in weak cases they are damp or dabbled with pupal fluid. They do not quit their cocoon as soon as the pupal state is terminated, but several days are subsequently spent within it, during which the ultimate state of perfection is attained.

The host-caterpillar is consumed before attaining the pupal state, as is evidenced by forty detached larval skins sent with, and thirteen actually attached to the cocoons, among the thousand which have passed through my hands. The parasitic larvae probably evacuate their hosts while the latter are passing the daytime underground and there spend the winter, since they are usually found during the digging of potatoes in October and November. I have only once known a single ♀ to emerge in the autumn, but this was certainly accidental. The normal period is from June 1st to July 22nd (for elaborate details of emergence cf. my paper on this species, E.M.M. 1903, pp. 157-164). A great number of the larvae are destroyed during the winter by mould, which attacked in one batch thirty-two in five hundred and fifty; a hyperparasitic Ichneumonid, *Mesochorus mandibularis*, Thoms., rarely also *M. thoracicus*, Grav., devour about twenty per cent., and a species of *Chalcid* is also found in the cocoons but I am of the opinion that this confines its slaughter to the *Mesochori*; and a few more fail to emerge through causes which are at present obscure, possibly natural ailments.\*

\* Some further details respecting this species may be of value from a biological aspect, since we know so little of the economy of the Ichneumonidae. Wigin sent me (7 x 99) 398 cocoons, of which one was malformed and proved abortive; from another one ♀ *Exetastes cinctipes* emerged on the 10th; and from a third one ♀, presumably hyper-parasitic, *Mesochorus thoracicus*, Grav., had emerged, with its wings dry, at 9.30 p.m. on 14th of the same month. Wigin next sent (18 xi 99) 172 cocoons, some of which, however, were already empty. From these two consignments, I found there had emerged, since the 6th, 26 ♂♂ and 3 ♀♀ *Exetastes* and one *Mesochorus mandibularis* ♂ by the 18th of the following June, proving that the ♂♂ emerge first; both sexes continued to emerge daily till July 5th when the ♂♂, and 8th when the ♀♀, fell off; though 5 more ♂♂ and 2 ♀♀ emerged between 12th and 18th July: in all 184 ♂♂ and 177 ♀♀ emerged. Thirty-two of the hyperparasitic *M. mandibularis* ♂♂ continued to emerge regularly till 15th of July, though most commonly from 4th to 8th of that month; but only 5 ♀♀ emerged in all between 29th June and 18th July. Thirty-two specimens of some species of *Pteromalus* also emerged. Hence of the above 570 cocoons, 401 produced perfect Hymenoptera and in others I found 9 ♂♂ and 8 ♀♀ perfect but dead *Exetastes*. Of the remaining cocoons 31 had been slain by *Pteromali* (in one the Chalcid larvae still remained in Oct. 1900, and were still soft); in 6 the larvae were found to have died of mould (one of these larvae very plainly showed the hyperparasitic *Mesochorus* larva within it); 6 larvae had died from obscure causes—probably the jars of transit; 8 perfect *Exetastes*, of equal sexes, died unemerged; one nearly fully formed imago had died of mould and one only half formed imago had died from obscure causes. Upon these cocoons I made the following notes:—(1) When the imago fails to emerge after attaining maturity it is generally found to be attached to its cocoon by its anal extremity, though in one case it was the wing that held it prisoner; more rarely the insect succeeds in boring an exit hole insufficient for its emergence, when small this may be mistaken for that of a Chalcid, though its size varies. (2) Sometimes, when the larva has been killed by mould, it occupies the whole cocoon and at others it is much shrivelled, occupying only one-third of it, which is probably due to the period of its growth at which the mould attacked it—though always, of course, full fed. (3) Whether the Chalcids attack *Exetastes* or *Mesochorus*, I am uncertain, but from the size of the half-formed Ichneumon (which is not sufficiently developed to allow of its distinctions being defined) and the punctuation of the pleurae, I am inclined to prefer the latter. (4) The Chalcids almost invariably emerge



Observations upon the copulation of Ichneumonidae are extremely rare; Gravenhorst collected a hundred thousand of them without meeting with a single example of it, but I have once met with it in the present species, of which both sexes were bred out on the 5th of June, 1900. In this case the pair remained quiet quiescent for half an hour; the ♂ held the ♀ with his anterior legs, the hind pair being retracted and in no way in use; the ♂ antennae were porrected, but those of the ♀ were laid back along the sides of the thorax.

I have no hesitation in asserting that this is the commonest species of all the Ichneumonidae in Britain, though its economy was for long unknown. Curtis, writing in 1860, says "It is difficult to account for the absence of the surface-caterpillars from our field crops for many years together, unless, as is generally the case, they are occasionally overpowered by parasitic insects; it is therefore not a little remarkable that I have never met with any of the parasites which we may presume are attached to these caterpillars; it is true that, as far as regards the *Noctua brassicae*, I find in gardens in June and July great numbers of an ichneumon, called *Exetastes osculatorius* of Fabricius, which appears to accompany that species, but, never having bred it, I have no direct evidence of their being connected in their economy" (Farm Insects, 130). Mr. Wigin has, however, confirmed the above connection by breeding nearly a thousand of this parasite from *Mamestra brassicae* and *Hadena oleracea* at Methley near Leeds; Wattam at Huddersfield and Brischke in Prussia have also bred it from the former host; and Clutten at Barnsley from both of them. It is also said to have been bred from *Retinia pinicolana* (Proc. S. Lond. Soc. 1890) and *Miana furuncula* (Entom. 1881, p. 141). I have seen it, or it is recorded, from Land's End, York, Earlham near Norwich, Essex, Barnstaple, Lidford, Nottingham, Carlisle, Aberlady,

through a single tiny hole in or near the extremity of the cocoon. (5) In one cocoon the Chalcid larvæ, though still moist, appeared to have died of some disease akin to constipation, since part of their bodies is quite hard in a circular lump, while the rest is soft and fleshy. (6) Chalcids rarely consume the whole Ichneumon, though I found them to have done so in one or two cases; they appear to emerge from their host's abdomen when the latter is about half formed, since the abdomen is found to be much eroded and shrivelled. (7) In one case the *Mesochorus* larva had emerged from the *Exetastes* larva, probably upon finding the latter moribund, and both were separately dead. (4a) In one instance only the Chalcid's hole of emergence was in the centre of the cocoon, near the girdle, in which case the whole of the larva almost had been consumed, and interiorly the hole was jagged and somewhat quadrangular, though externally circular and a little larger than is usually the case—? distinct species of Chalcid.

Wigin sent (31 x 00) another 100 cocoons, from which 10 ♂♂ and 6 ♀♀ emerged, 12 ♂♂ and 1 ♀ had cut holes but failed to emerge, and 7 ♂♂ and 2 ♀♀ *Mesochorus* had emerged with no failures, between 7th and 26th of the following June. Thence to the 30th June, 7 ♂♂ and 6 ♀♀ *Exetastes* and 9 *Mesochorus* emerged. Subsequently 10 ♂♂ and 3 ♀♀ *Exetastes* and 20 *Mesochorus* emerged. In one case I watched the ♂ emerge: the cocoon is saturated with oral fluid (? from the ligula) and the mandibles bite it away, as a moth caterpillar eats the edge of a leaf, in sweeping semicircles (unlike the *Cimbicidae*, etc.), when the hole is large enough the insect walks straight out, head first, with no hesitation. Of the remaining cocoons I noted:—(8) Three larvæ died of mould, four from injuries or draught, and three more were dead though still soft and black; two pupæ died of injuries or dryness. (9) One *Mesochorus* died, though fully formed, through the cocoon being impressed and another nearly fully formed from the same cause, which was not apparent in a third, dead in the same state of development. (10) One contained 18 live yellow Chalcid larvæ and pupæ—on 5th April, 1902—together with a dead pupa, certainly of *Mesochorus mandibularis*.

In October, 1901, I received two more large consignments from the same source, which went to show that the date of emergence sometimes extends to the end of July, that the larva does not undergo its ecdysis till the following April (as is usual in all Hymenoptera), and that these *Exetastes*—perhaps most Ichneumonidae—seem to almost invariably emerge between midnight and 9 a.m. the following morning.

Birmingham, Plumstead, St. Ervan in Cornwall, Worksop, West Runton in Norfolk, Derbyshire, Woodbridge, Bristol, Guernsey, Alderney, London, Deal, Bottesford in Lincs., Leeds, Wigtonshire, Solihull, Comiston near Edinburgh and Ballaugh in the Isle of Man. It is very common in gardens at Galashiels and Ipswich, feeding freely on the flowers of *Heracleum* and *Angelica*; and is undoubtedly the *E. albidilarsis* of Dallas (Elements of Entom. 236)—“one of the most abundant species, and one which we can hardly fail to meet with hovering amongst the twigs of lilacs and other shrubs in the garden, or over the hedge-plants by the way-side.” I have seen the female sitting perpendicularly on a sunflower leaf, cleaning its antennae and mouth-parts exactly as a cat cleans its ears, etc.; later the same day it was on the highest flower of *Angelica* sucking the stylopods and feeling forward with its antennae; when they touched a *Microgaster*, they were elevated together, held suspended for a moment as though to fully appreciate the sensation transmitted by the impact, and then thrust out to feel again; upon again touching the Braconid the *Exetastes* swiftly moved aside to a different part of the flower, though the Braconid appeared in no way pugnacious. I have seen this species on flowers up to September 6th. It occurs throughout central and northern Europe, extending to Lapland.

## 2. *nigripes*, Grav.

*Exetastes nigripes*, Gr. I.E. iii. 416, excl. var.; Ratz. Ichn. d. Forst. iii. 94; Holmgr. Sv. Ak. Handl. 1854, p. 26; *lib. cit.* 1858, n. 8, p. 153; Thoms. O.E. xxii. 2315, ♂ ♀. Var. *E. illusor*, Gr. I.E. iii. 427; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 151; Thoms. O.E. xxii. 2416, ♂ ♀; Morl. E.M.M. 1903, p. 160, ♀; cf. Voll. Pinac. pl. xvii. fig. 4.

Shining, punctate, black. Head punctate and somewhat narrowed behind the eyes; of ♀ immaculate, of ♂ usually with a mark at the clypeal orbits, and another at the centre or base of the mandibles, flavous; clypeus deplanate, a little elevated basally and rounded apically; mandibles curved, with the teeth of equal length. Antennae setaceous, about as long as the body and strongly attenuate towards their apices with the basal flagellar joint one-third longer than the second. Thorax stout, gibbous, punctate and narrower than the head; metathorax rugose, or in ♂ strongly punctate, above with the areae incomplete and spiracles linear. Scutellum black. Abdomen fusiform, glabrous and nitidulous, apically subcompressed, narrower than the thorax; black with the apex of the first segment and whole of the second to fourth red, or with the two latter apically infusate; basal segment narrow, nearly thrice longer than broad, slightly dilated apically, with the tubercles a little prominent; second and third of equal length, the fifth rarely basally rufescent; terebra half as long again as the basal segment, with linear valvulae. Legs very

long, with the anterior slender; front ones more or less fulvescent or ferrugineous, with the coxae, trochanters and base of femora always black; hind ones not slender, nearly always entirely black though rarely with the tibiae basally ferrugineous; ♂ with the third and fourth hind tarsal joints white. Wings slightly clouded; stigma infusate-fulvescent, tegulae black, radix and radius infusate; areolet sessile. Length, 7—11 mm.

Holmgren says it may be known by the colour of the legs, adding that the wing nervures are similar to those of *E. femorator*, from which Thomson distinguishes it solely by the colour of the hind femora. But I am convinced that *E. illusor* is nothing but a colour variety of *E. nigripes*: their structure agrees exactly in every particular, as the following description of authors will show.

Var. *ILLUSOR*.—Head punctate and very little narrowed behind the eyes; of ♀ immaculate; of ♂ with palpi, clypeus, labrum, mandibles centrally, the inner orbits and generally most of the face, stramineous; clypeus deplanate and apically subtruncate. Antennae subsetaceous, elongate and strongly attenuate towards the apices; of ♂ as long as the body and immaculate, of ♀ two-thirds the length of the body and with joints fourteen to eighteen white above. Thorax gibbulous, stout, punctate and narrower than the head; metathorax rugulose above with no areas and the spiracles sublinear. Scutellum black. Abdomen elongate-fusiform, glabrous and nitidulous, as long or longer than the head and thorax; red, with the base of the first segment and more or less of the anus black; basal segment glabrous and slightly curved, its postpetiole a little dilated apically and hardly twice as broad as the petiole; fourth segment shorter than the third, plica testaceous; terebra a little longer than half the first segment, and the anal styles shortly exerted. Legs red, with the coxae and trochanters black; anterior femora generally basally, the hind ones at their apices, black; the curved hind tibiae towards their apices more or less broadly, and their tarsi, infusate with the two or three central joints of the latter white. Wings normal, more or less clouded; stigma testaceous, tegulae piceous; areolet subirregularly subpetiolate. Length, 9—11 mm.

Its variety is of the same conformation, Holmgren tells us, as *E. nigripes*, especially as regards the analogous wings and legs; and I have pointed out (*l.c.*) that the ♀, excepting its red body, very strongly resembles that of *E. cinctipes*, but the head and thorax are more shining and strongly punctate, the former is broader, the antennae are thinner, the wings smaller with darker venation, the metathorax apically more prominent at the sides with the metapleural costae more distinct; I am not, however, aware that these distinctions will prove to be constant; and shall be by no means surprised if *E. cinctipes*, *E. illusor* and *E. nigripes* prove but colour varieties of a single species.

This species, as already shown, varies very considerably in the colour of the legs and also slightly in the ♂ capital decoration; in my ♂♂ of the var. *illusor* the anterior coxae and trochanters are broadly flavous-marked and the scutellum apically dotted with the same colour; Gravenhorst mentions a ♀ with the hind tarsi infuscate throughout; and I have a ♀ intermediate in colouration between the typical and varietal forms, having the legs black with the anterior tibiae and the basal half of the hind femora red.

A remarkable abnormal ♂ of this species, taken by Dr. Capron in Surrey, is now in my collection, in which the nervellus does not touch the first recurrent nervure at all, but is emitted by the median a quarter of a millimetre beyond its emission of the first recurrent; in all other respects the specimen is normal, with red legs and immaculate scutellum.

This species is not uncommon on the Continent in June in woody and grassy places; Ratzeburg has bred it in Germany from *Euprepia lubricipeda* and *Noctua Abrotani* in July; Dr. Giraud has raised the var. *illusor* in France from *Pieris brassicae* and, in Prussia, Brischke also bred it from *Hadena contigua*. It is by no means an uncommon species in Britain, though the type form appears to be much the rarer but has been bred by Osborne from *Hadena oleracea* (Entom. 1884, p. 68) and by Bignell, who also captured it at Pennycomequick in Devonshire, from *Mamestra brassicae* on 9th July. I possess but two females of the type form both taken in August, one at Mortchoe, in North Devon, 1903, by Mr. Selwyn Image and the other on the flowers of *Angelica sylvestris* in Matley Bog, in the New Forest, by myself in 1901. My specimen of the intermediate form was taken at Redland, near Bristol, by Mr. Charbonnier. The var. *illusor* is much more generally met with and has been recorded from Harford Bridges, in Norfolk, in July (Bridgman); Bickleigh, in June and bred by Barker from *Saturnia pavonia minor* (Bignell); bred by Weston from *Mamestra persicariae* (Entom. 1881, p. 141); and probably from *Arctia caja* at Maldon, in Essex, by Fitch (*l.c.* 1883, p. 67). I have seen it from Worksop (Houghton); Shere, several (Capron); Ashby, near Doncaster, in early July (Cassal); Sutton, near Retford, Notts (Thornley); and have swept it myself on the banks of the Orwell, near Ipswich, in the middle of July, 1896. Among 172 *Exetastes* cocoons, which had probably all emerged from *Mamestra brassicae*, sent by Mr. Wiggin from Methley, near Leeds, on 18th November, 1899, only one produced a female of this species on 26th of the following June (*cf.* *E. cinctipes ante*); another cocoon was sent by Mr. Clutton *ex Hadena pisi*, from Burnley, Lanes., in Dec. 1901, which also produced a female on 15th of the following June, and the insect lived in confinement till the 21st. The cocoon is exactly like that of *E. cinctipes*, is made of the same number of layers, containing the shrivelled larval skin thrust into the anal extre-

mity and the imago effects its escape by similarly gnawing away the envelope in long strips. Mr. Campbell-Taylor sent me both cocoon and imago from Cardiff, where he had dug the former at the base of a tree and bred the latter on 6th June, 1902.

### 3. *guttatorius*, Grav.

*Exetastes guttatorius*, Gr. I.E. iii. 411, excl. var.; Holmgr. Sv. Ak. Handl. 1854, p. 27; *lib. cit.* 1858, n. 8, p. 154; Thoms. O.E. xxii. 2417, ♂ ♀. Voll. Pinac. pl. xvii, fig. 5, ♂.

A bright species with pale scutellum and red abdomen. Head transverse and somewhat narrowed behind the eyes, immaculate in both sexes; clypeus shagreened with scattered punctures, apically subdeplanate, rounded, and in ♂ sometimes rufescent; face centrally elevated. Antennae not elongate, of ♂ apically gradually attenuate and as long as the body, of ♀ subfiliform and not longer than the abdomen; both sexes with joints ten to seventeen or twenty white above; basal flagellar joint only one-third longer than the second. Thorax stout and punctate; ♂ with pronotum and a small callosity before the radix nearly always white; metathorax very strongly punctate with the areae and apophyses entirely wanting, petiolar rarely indicated basally; spiracles linear. Scutellum white, with its extreme base alone black. Abdomen fusiform, glabrous and nitidulous, more pilose in ♂; red with more or less of the basal segment and sometimes the anus infuscate; first segment slightly curved and a little dilated towards the apex with postpetiole nearly twice broader than the petiole; second and third segments subequal in length; terebra hardly shorter than the basal segment. Legs normal and red with the coxae and trochanters black; anterior femora rarely basally nigrescent; hind tibiae and tarsi black, with the central joints of the latter clear white in ♂ alone. Wings subhyaline, stigma and radix infuscate or ferruginous; tegulae black, and, in ♂, marked with flavous. Length, 9—10 mm.

This species may be known by the colour of the legs and antennae, and by the latter's discreted flagellar joints, of which the second is only a little (not twice) longer than broad. It is one of the most distinct of the genus, both in colouration and sculpture; the mesonotum is intermediate in its puncturation between that of *E. cinctipes* and of *E. laevigator*, with which the short antennae of the present species ally it, though the white scutellum is distinctive, as also may be considered the small glabrous and nitidulous tubercle between and immediately below the scrobes.

It occurs on umbelliferous plants in August and September; and is common throughout the midland and southern counties, though I have seen none from the northern. North Langwith (Prof. Carr); Cheddar,

in July (Charbonnier); Alderney (Luff); common at Shere, in Surrey (Capron); in Lyndhurst garden, in July (Adams); Ripple, near Dover, in August (Sladen); Guestling, near Hastings (Bloomfield); Felden, in Herts (Piffard); Bovey Tracey, in Devon, in August (Hamm); Kings Lynn (Atmore); Eastbourne (Nurse); Mousehold Heath, Norwich (Bridgman); Bungay and Tostock, in Suffolk, in autumn (Tuck). It is usually found in August on the flower-tables of *Angelica sylvestris* and *Heracleum sphondylium*, though sometimes swept from the herbage in woods. I have taken it in the Bentley Woods, near Ipswich, in 1894; in the Havenstreet Woods, in the Isle of Wight, at the end of June, 1907; and on flowers in Finborough Park, near Stowmarket and at Lyndhurst, in the New Forest, in August. It does not appear to have been bred in Britain, though on the Continent it has been raised by Snellen in Holland from *Noctua Alsines*, and in France by Dr. Giraud from *Toxocampa pastinum*.

#### 4. *femorator*. Desv.

*Exetastes femorator*, Desv. Cat. 94, ♂ ♀; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 152; Voll. Pinac. pl. xvii, fig. 6; Thoms. O.E. xxii. 2415, ♀.

A black, shining and punctulate species with the abdomen centrally broadly red and the nervelet elongate. Head punctate, a little broader than the thorax and somewhat narrowed behind the eyes; clypeus deplanate and apically rounded; mouth produced. Antennae setaceous and longer than half the body; immaculate. Thorax stout, gibbulous and punctate; metathorax with the upperareae strongly incomplete. Scutellum black. Abdomen glabrous and nitidulous, longer than the head and thorax, and apically compressed; red with the basal half of the first segment, apex of the fourth and whole of the remainder, black; basal segment slightly curved and subdilated towards the apex; the second and third subequal in length; venter of ♀ rufo-testaceous, with the apical segments produced and somewhat compressed; terebra two-thirds the length of the basal segment. Legs black or nigrescent; anterior slender, of ♀ with the base of their tibiae and apices of the front femora paler, of ♂ with the tibiae and tarsi red; hind ones not slender with their femora, except apically above, sanguineous. Wings infusate with the nervelet extending nearly to the centre of the first cubital cell; stigma fulvescent or piceous, and tegulae black. Length, 8—10 mm.

This species is said to be at once recognised by having the second and third segments entirely, the first broadly at the apex, the base of the fourth, and nearly the whole of the hind femora, red; the anterior femora apically, and the front tibiae in front, rufescent; and by the basally serrate claws which extend beyond the pulvilli.

Both sexes were described by Desvignes from examples, with no locality, in his own collection; but Fred. Smith writes (*Ent. Ann.* 1857, p. 33) in his Notes on Hymenoptera in 1856, "I captured about a dozen specimens of *Exetastes femorator*, a species first described by Mr. Desvignes, in his Catalogue of British Ichneumonidae, recently published by the Trustees of the British Museum. This insect has not been met with in any other locality than the Deal Sands, where I found it. Its mode of running and flying so closely resembles a *Pompilus*, that at first sight I mistook it for one." These specimens were almost certainly identified by Desvignes himself, and two females labelled "Deal 1856" are in the British Museum, with the types of both sexes. There is no later record of the male, but the female has been taken by Brischke in Prussia and by Holmgren in Sweden.

### 5. *leavigator*, Vill.

*Ichneumon leavigator*, Vill. Linn. Ent. iii. 193. *Exetastes leavigator*, Gr. I.E. iii. 424; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 151; Thoms. O. E. xxii. 2416, ♂ ♀. *E. bicoloratus*, Gr. I.E. iii. 421, ♂ ♀; Voll. Pinac. pl. xvii, fig. 5, ♂; cf. Thoms. l.c. *E. crassus*, Gr. I.E. iii. 423, ♀. *Tryphon incurvator*, Zett. I.L. 386 (part.).

A stout species with red body and femora. Head as broad as thorax, punctate and somewhat broad behind the eyes, with brown pilosity; clypeus deplanate and apically truncate; mandibles punctate with the apical teeth of equal length; palpi infusate. Antennae immaculate and somewhat stout; of ♂ hardly as long as, of ♀ distinctly shorter than the body; flagellar joint somewhat discreted. Thorax stout and pilose, gibbulous and punctate; notauli obsolete; metathorax rugulose punctate with the areae and apophyses wanting; petiolar area short and basally incomplete; spiracles linear. Scutellum black and distinctly punctate. Abdomen not broad, glabrous and nitidulous; with the second, third, apex of the first and often more or less of the fourth segment, red; basal segment subelevated in front and a little curved, straighter in ♂, with the spiracles conspicuous and often a discal fovea before the apex; plica red; terebra as long as the basal segment, with linear valvulae. Legs somewhat stout and red; coxae and trochanters black; the hind tarsi and more or less of the apices of their tibiae infusate, with the fourth and fifth joints of the former rufescent or in ♂ sometimes whitish; tarsal claws short. Wings clouded, stigma dull fulvescent; areolet irregular, sessile or petiolate. Length, 7—10 mm.

The forms *bicoloratus* and *crassus* appear to differ in nothing essential but their slightly larger size and stouter conformation (cf. Holmgren, l.c.). Thomson hesitated to associate the former on account of Gravenhorst's insistence upon the divergence of abdominal shape; to the latter he makes no reference.

This species is not unlike *E. nigripes* and *E. illusor*, but with the head entirely black, the ♀ antennae shorter, and the basal segment broader and more curved; the ♀ may be further known by its doubly long terebra, immaculate antennae and ferrugineous-, not white-, banded tarsi. It is an altogether stouter and thicker insect, with the whole thorax clothed with very short erect setae.

It is a common species on the Continent from June to August on umbelliferae; and Giraud has bred the variety *bicoloratus* from *Cucullia scrophulariae* in France. I have several specimens of both sexes taken by Dr. Capron about Shere in Surrey, and one from Felden in Herts. from Mr. Piffard's collection.

### 6. *aethiops*, Grav.

*Exetastes aethiops*, Gr. I.E. iii. 398, ♂ ♀.

Head black; of ♂ with the clypeus, sometimes also a mandibular and a facial mark pale testaceous. Antennae nearly as long as the body and apically curved; somewhat shorter in ♀. Thorax gibbulous with subtestaceous pilosity and, like the scutellum, immaculate. Abdomen a little longer and narrower than the head and thorax, of ♂ convex and of ♀ apically compressed; basal segment canaliculate and gradually dilated towards the apex, with the post-petiole a little longer than broad and the tubercles somewhat before the centre; terebra one-seventh the length of the abdomen. Legs black with the anterior, except their coxae and trochanters, red; anterior femora of ♂ sometimes infusate above, hind ones of ♀ castaneous beneath; hind tibiae of ♂ sometimes centrally paler. Wings somewhat clouded; stigma and radius infusate, radix and ♂ tegulae stramineous, latter infusate in ♀; areolet irregularly triangular and petiolate. Length, 11—12 mm.

Gravenhorst instances a ♂ variety, which is rather larger with the mouth and clypeus red; the antennae a little shorter and stouter, dull ferrugineous with the two basal joints black; the abdomen rather longer and all the femora red. It is most probably distinct.

This species is similar in size and conformation to *E. fulvipes*, Grav., but with the antennae, wings and legs longer. The latter is thought to be probably synonymous with *Notopygus fulvipes*, Zett. (Ins. Lapp. 386) by Holmgren (Sv. Ak. Handl. 1858, n. 8, p. 378) and in all likelihood *E. aethiops* has as little relation with this genus as now understood. The short antennae and pilose thorax are similar to *E. leavigator*.

It is said to occur on umbelliferous flowers in woody places in early August. No one, however, appears to have recognised it, though Marshall introduced it as British in his "Catalogus" of 1870; it is not represented in my own or the British Museum collections,



7. *fornicator*, Fab.

*Ichneumon fornicator*, Fab. S.I. i. 432, ♀. *Banchus fornicator*, Fab. Piez. 127, ♀. *Exetastes fornicator*, Gr. I.E. iii. 404; Holmgr. Sv. Ak. Handl. 1858, n. 8, p. 150; Voll. Pinac. pl. xvii, fig. 2; Thoms. O. E. xxii. 2415, ♂ ♀. *Tryphon fornicator*, Zett. I.L. 386.

A large stout black species with somewhat clouded wings and elongate, unicolorous antennae. Head somewhat broad behind the eyes, with fulvescent pilosity; frons very slightly impressed and punctate; face flat and distinctly punctate; mouth produced with the apex of the shagreened clypeus deflexed throughout; mandibles subparallel-sided with the teeth of equal length. Antennae filiform, apically attenuate and of ♂ as long as the body, of ♀ somewhat shorter; basal flagellar joint nearly double length of the second. Thorax stout and gibbulous; mesonotum distinctly and evenly punctate; metathorax rugosely punctate, strongly canaliculate centrally with the areae obsolete and spiracles linear. Scutellum convex and strongly punctate, black. Abdomen glabrous and nitidulous, fusiform and laterally clavate, as long as head and thorax or slightly longer, black; basal segment quite twice longer than broad, gradually subdilated apically and punctulate laterally, with the tubercles a little before the centre; second and third rarely obsoletely badious, transverse and of about equal length, with following shorter; terebra half length of basal segment or one-sixth of the abdomen. Legs normal; bright fulvous with all the coxae and trochanters jet black; hind ones longer and stouter with tarsi, except usually the fifth joint, and apices of tibiae infusate. Wings usually considerably clouded, with the stigma and radix piceous or ferruginous; tegulae nigrescent; areolet shortly petiolate and emitting the recurrent nervure from near its centre; nervellus intercepted far above its centre. Length, 9—13 mm.

This species is rendered abundantly distinct by its entirely black abdomen which rarely has the second or third segment apically castaneous, the terebra nearly half shorter than the first segment and its elongate pulvilli. It is one of the largest of the genus in Europe.

Brischke describes the cocoon as "cylindrisch, dünnhäutig, glänzend, doppelt, schwarz."

It is said to be very common upon the Continent in woody and grassy places upon umbelliferous flowers from June to August, sometimes on *Angelica sylvestris* in September, and rarely found as late as the beginning of October; it is a well-known parasite of *Noctua oleracea* according to Van Vollenhoven, and Brischke has bred it in Prussia from *Cucullia balsamiae*. With us it appears very rare, and the only record I can find is Bignell's capture of it in the Plymouth district. I have, however, seen both sexes taken at St. Ervan, in Cornwall, by Mr. Davies in 1902, and a female found at Barmouth, in Merioneth, by Mr. Donisthorpe in 1906.

8. *calobatus*, Grav.

*Exetastes calobatus*, Gr. I. E. iii. 405, ♀; Bridg. Entom. 1878, p. 36, ♂.

A large, black species with red hind coxae and femora. Head dull and scabrous throughout, somewhat narrowed behind the eyes; face somewhat coarsely punctate and pubescent, slightly elevated longitudinally in the centre and in the ♂ with the lower orbits broadly, whole of the narrow clypeus, mandibles except their subacuminate and infuscate teeth, flavous; its palpi and ligula red. Antennae slender, subsetaceous, immaculate, as long as the body in ♀ and one fifth longer in ♂; scape with griseous pilosity. Thorax subcylindrical and dull with the notauli discally conspicuous; metathorax rugulose and more or less conspicuously canaliculate in the centre; petiolar area very short and basally incomplete; lateral costae strong but with no apophyses; spiracles sublinear. Scutellum convex and distinctly punctate, black; of ♂ with two apical flavous dots. Abdomen narrower and a little longer than the head and thorax, immaculate, fusiform and apically subcompressed; basal segment nearly thrice longer than broad and gradually slightly explanate apically, with spiracles just before its centre and sparse but distinct puncturation to its apical third, thence glabrous; ♂ valvulae conspicuous; terebra stout and nearly as long as the basal segment. Legs slender and fulvous-red; anterior of ♀ with the distinctly and evenly punctate coxae and trochanters black, and the tarsi apically infuscate; front coxae of ♂ flavidous; hind legs elongate and stouter with the tarsi, tibiae and apices of ♀ femora black, and the pilose trochanters more or less infuscate; tarsal claws strongly curved and not pectinate. Wings very slightly clouded; stigma, radius and ♀ tegulae black, ♂ tegulae flavidous; radix dull ferrugineous; areolet irregularly triangular and subsessile; first recurrent nerve of the lower wings curved and emitting the nervellus from far above its centre. Length,  $12\frac{1}{2}$ —13 mm.

This species is similar to *E. fornicator*, but is distinguished by the more slender thorax and antennae, differently coloured legs, and by the narrower basal segment, the peculiar puncturation of which is very distinctive. It is correctly ascribed to this genus.

No one appears to have noticed this insect, since two females were described from Piedmont and Netley in Shropshire by Gravenhorst, till Bridgman took the ♂ in 1878. I possess a carded example of both sexes in Capron's collection, which were in all probability given him by Bridgman, since they have been pinned. From them I have been enabled to draw up the above somewhat full description of this interesting species. The males were found at Earlham near Norwich in September; and Big-nell subsequently took this species, which appears to be very scarce with us, at Trew, near Crediton, in Devon, as late as 14th October.

9. *maurus*, Desv.

*Exetastes maurus*, Desv. Cat, 95, ♀. *E. facialis*, Desv. loc. cit. ♂.

♀. Black. Head with the mouth piceous or dark ferrugineous; eyes very prominent. Antennae slender and nearly as long as the body; immaculate. Thorax gibbulous; metathorax scabrous; areola elongate and entire, centrally dilated with no costulae; petiolar area short; spiracles transverse and linear. Scutellum black, rarely in ♀ apically binotated with flavous. Abdomen immaculate, narrower than, and with basal segment about one-third the breadth of, the thorax; first segment with tubercles distinctly before the centre, between which and the base it is obsoletely punctate and pilose; apical ventral segments deflexed and compressed; terebra one fourth the length of abdomen. Legs elongate, slender, black; front tibiae and apical half of their femora infusate; intermediate legs, including apices of their femora, darker; anterior tibiae and the front femora internally testaceous. Wings with the stigma testaceous and areolet subsessile, nervellus intercepting far above the centre. Length, 14—15 mm.

♂. Black. Head with the face flavous, except triangularly beneath the scrobes; apices of mandibles piceous. Antennae very slender, as long as the body and apically reflexed. Thorax immaculate with the metathorax dull. Scutellum mainly white. Abdomen black and narrow; basal segment subpetiolate and hardly narrower than the second, with the tubercles a little before the centre; third and following segments attenuate to anus; ventral valvulae exerted. Legs pale testaceous with the hind ones obscurely badious; coxae black with the front ones entirely, and the intermediate beneath flavous. Wings with stigma and tegulae testaceous; areolet large, triangular and subsessile.

The two ♀♀ in the British Museum, from Desvignes' and Stephen's collections, are like black legged *E. calobatus*, but are certainly a good species, with testaceous stigma and the basal half of the first segment closely and very finely punctate. There, too, is a single ♂ of *E. facialis*, which appears to me to be undoubtedly the opposite sex of *E. maurus*, this is Desvignes' type; it has the anterior legs pale and the scutellum broadly white at its apex. The ♂ differs only in having the scutellum pale, the metathoracic areola obsolete, basal segment apically narrower, anterior femora and tibiae fulvous with hardly darker tarsi and the mandibles except apically, clypeus, face except triangularly below the antennae, and the anterior coxae and trochanters all flavous.

No one has ventured to record this species since it was first described as British; it certainly has not occurred to me, but is very probably mixed with *E. calobatus* in collections.

10. *gracilicornis*, Grav.

*Exetastes gracilicornis*, Gr. I.E. iii. 429, ♀; cf. Brisch. Schr. Ges. Nat. Danz. 1880, p. 199.

Head with the palpi testaceous, labrum and centre of mandibles badius. Antennae with joints thirteen to sixteen white. Thorax with a white callosity beneath the radix. Scutellum white, sometimes with a basal black dot. Abdomen fusiform, a little longer than the head and thorax, and as broad as the latter; black with the three basal segments entirely red, and the sixth and seventh white-margined; basal segment a little longer than broad, and gradually narrowed towards the base; anus obtuse and somewhat compressed; terebra a little shorter than the basal segment. Legs red with the coxae and, except generally their apices, the trochanters black; apices of the hind femora and of their tibiae, with the basal joint of their tarsi, black. Wings testaceous-hyaline with stigma, radix and radius testaceous-fulvous; tegulae black. Length, 9 mm.

This ♀ is said to differ from *E. illusor* in having the antennae a little more slender and the legs a little shorter, though especially in its distinctly stouter abdomen, which resembles that of *E. robustus*, Grav. It may at once be known from all our other species of this genus, to which it appears doubtful that it belongs, by its very short basal segment.

"Tres feminas Besser e Tauria transmisit" (Grav.). It has for long stood in our catalogues and must, consequently, be accorded a position here; but the single pair, standing under this name in the British Museum certainly do not represent Gravenhorst's species, since their basal segment is decidedly elongate. In all probability it is not British. Very little appears to be known of it abroad.



*Banachus volutatorius*, Linn.

[The illustration in the title page is *Meniscus setosus*, Fourc.]

# Catalogue.

A CLASSIFIED LIST OF THE BRITISH PIMPLINAE AS ENUMERATED  
IN THIS VOLUME.

Order. **HYMENOPTERA.**

Section. *ICHNEUMONIDEA.*

Family. *ICHNEUMONIDAE.*

Sub-Family. **PIMPLINAE.**

Tribe. **XORIDIDES.**

*ECHTHRUS*, *Grav.*

1. *reluctator*, *Linn.*
2. *nubeculatus*, *Grav.*

*POEMENIA*, *Holmgr.*

1. *hectica*, *Grav.*

*PHIDIAS*, *Foll.*

1. *aciculatus*, *Foll.*

*TROPISTES*, *Grav.*

1. *nitidipennis*, *Grav.*

*ODONTOMERUS*, *Grav.*

1. *dentipes*, *Gmel.*

*ISCHNOCERUS*, *Grav.*

1. *rusticus*, *Fourc.*

*XORIDES*, *Latr.*

1. *albitarsus*, *Grav.*
2. *nitens*, *Grav.*
3. *scutellaris*, *Desv.*

*XYLONOMUS*, *Grav.*

1. *precatorius*, *Fab.*
2. *rusticus*, *Desv.*

*XYLONOMUS*—*continued.*

3. *irrigator*, *Fab.*
4. *pilicornis*, *Grav.*
5. *securicornis*, *Holmgr.*

Tribe. **PIMPLIDES.**

*RHYSSA*, *Grav.*

1. *persuasoria*, *Linn.*
2. *leucographa*, *Grav.*
3. *curvipes*, *Grav.*

*EPHIALTES*, *Schr.*

1. *manifestator*, *Linn.*
2. *mesocentrus*, *Grav.*
3. *tuberculatus*, *Fourc.*
4. *heteropus*, *Thoms.*
5. *carbonarius*, *Christ.*
6. *striblorium*, *Ratz.*
7. *albispiculus*, *Morl.*
8. *ruficollis*, *Desv.*

*PERITHOUS*, *Holmgr.*

1. *albicinctus*, *Grav.*
2. *mediator*, *Fab.*
3. *varius*, *Grav.*
4. *divinator*, *Rossi.*

*THERONIA*, *Holmgr.*

1. *atalantae*, *Poda.*

PIMPLA, *Fab.*

1. roborator, *Fab.*
2. ruficollis, *Grav.*
3. graminellae, *Holmgr.*
4. Hibernica, *Morl.*
5. rufipleura, *Bignell*
6. inquisitor, *Scop.*
7. similis, *Bridg.*
8. robusta, *Morl.*
9. Taschenbergi, *D.-T.*
10. diluta, *Ratz.*
11. melanocephala, *Grav.*
12. arundinator, *Fab.*
13. didyma, *Grav.*
14. brevicornis, *Grav.*
15. punctiventris, *Thoms.*
16. pomorum, *Ratz.*
17. gallicola, *Morl.*
18. pictipes, *Grav.*
19. sagax, *Htg.*
20. calobata, *Grav.*
21. nucum, *Ratz.*
22. inanis, *Schr.*
23. detrita, *Holmgr.*
24. ventricosa, *Tschek.*
25. mandibularis, *Grav.*
26. instigator, *Fab.*
27. aethiops, *Curt.*
28. arctica, *Zett.*
29. examinator, *Fab.*
30. turionellae, *Linn.*
31. maculator, *Fab.*
32. alternans, *Grav.*
33. epeirae, *Bignell.*
34. curticauda, *Kriech.*
35. brassicariae, *Pod.*
36. rufata, *Gmel.*
37. oculatoria, *Fab.*
38. ornata, *Grav.*
39. ovivora, *Boh.*
40. Bridgmani, *Bignell.*

POLYSPHINCTA, *Grav.*

1. variipes, *Grav.*
2. subrufa, *Bridg.*
3. tuberosa, *Grav.*
4. multicolora, *Grav.*
5. carbonata, *Grav.*
6. Bohemani, *Holmgr.*
7. percontatoria, *Müll.*
8. gracilis, *Holmgr.*

ACRODACTYLA, *Hal.*

1. madida, *Hal.*
2. degener, *Hal.*

SCHIZOPYGA, *Grav.*

1. podagrica, *Grav.*
2. circulator, *Panz.*
3. minuta, *Grav.*

COLPOMERIA, *Holmgr.*

1. quadrisculpta, *Grav.*

CLISTOPYGA, *Grav.*

1. incitator, *Fab.*
2. rufator, *Holmgr.*

LYCORINA, *Holmgr.*

1. triangulifera, *Holmgr.*

GLYPTA, *Grav.*

1. bicornis, *Boie.*
2. elongata, *Holmgr.*
3. monocerus, *Grav.*
4. fronticornis, *Grav.*
5. ceratites, *Grav.*
6. parvicornuta, *Bridg.*
7. genalis, *Möll.*
8. rubicunda, *Bridg.*
9. femorator, *Desv.*
10. haesitator, *Grav.*
11. trochanterata, *Bridg.*
12. vulnerator, *Grav.*
13. similis, *Bridg.*
14. filicornis, *Thoms.*
15. tenuicornis, *Thoms.*
16. resinanae, *Htg.*
17. teres, *Grav.*
18. punctifrons, *Bridg.*
19. pedata, *Desv.*
20. sculpturata, *Grav.*
21. incisa, *Grav.*
22. annulata, *Bridg.*
23. nigrina, *Desv.*
24. parvicaudata, *Bridg.*
25. lugubrina, *Holmgr.*
26. rufata, *Bridg.*
27. scalaris, *Grav.*
28. bifoveolata, *Grav.*
29. flavolineata, *Grav.*
30. cicatricosa, *Ratz.*
31. evanescens, *Ratz.*
32. lineata, *Desv.*
33. ruficeps, *Desv.*

*Tribe.* LISSONOTIDES.STILBOPS, *Först.*

1. chrysostoma, *Grav.*

ARENETRA, *Holmgr.*

1. pilosella, *Grav.*

CRYPTOPIMPLA, *Tasch.*

1. caligata, *Grav.*
2. calceolata, *Grav.*
3. brachycentra, *Grav.*
4. errabunda, *Grav.*
5. blanda, *Grav.*
6. anomala, *Holmgr.*

LISSONOTA, *Grav.*

1. parallela, *Grav.*
2. lineata, *Grav.*
3. insignita, *Grav.*
4. leucogona, *Grav.*
5. Fletcheri, *Bridg.*
6. vicina, *Holmgr.*
7. quadrinotata, *Grav.*
8. linearis, *Grav.*
9. obsoleta, *Bridg.*
10. nitida, *Bridg.*
11. subaciculata, *Bridg.*
12. bellator, *Grav.*
13. argiola, *Grav.*
14. variipes, *Desv.*
15. cylindrator, *Vill.*
16. sulphurifera, *Grav.*
17. femorata, *Holmgr.*
18. culiciformis, *Grav.*
19. Halidayi, *Holmgr.*
20. variabilis, *Holmgr.*
21. rufomedia, *Bridg.*
22. frontalis, *Desv.*
23. unicincta, *Holmgr.*
24. trochanteralis, *D.-T.*
25. deversor, *Grav.*
26. carbonaria, *Holmgr.*
27. transversa, *Bridg.*
28. varicoxa, *Thoms.*
29. segmentator, *Fab.*
30. distincta, *Bridg.*
31. nigridentis, *Thoms.*
32. errabunda, *Holmgr.*
33. dubia, *Holmgr.*

MENISCUS, *Schiöd.*

1. setosus, *Fourc.*
2. catenator, *Panz.*
3. agnatus, *Grav.*
4. sulcator, *Morl.*
5. pimplotor, *Zell.*
6. impressor, *Grav.*
7. murinus, *Grav.*
8. plantarius, *Grav.*

PHYTODIAETUS, *Grav.*

1. polyzonias, *Först.*
2. coryphaeus, *Grav.*
3. ornatus, *Desv.*
4. geniculatus, *Thoms.*
5. obscurus, *Desv.*
6. astutus, *Grav.*

SYZEUCTUS, *Först.*

1. maculatorius, *Fab.*
2. irrisorius, *Rossi.*
3. bicornis, *Grav.*

PROCINETUS, *Först.*

1. decimator, *Grav.*

LAMPRONOTA, *Hal.*

1. caligata, *Grav.*
2. melancholica, *Grav.*
3. accusator, *Fab.*

*Tribe.* ACAENITIDES.ACAENITUS, *Latr.*

1. arator, *Rossi.*
2. dubitator, *Panz.*

COLLYRIA, *Schiöd.*

1. calcitrator, *Grav.*
2. puncticeps, *Thoms.*

COLEOCENTRUS, *Grav.*

1. croceicornis, *Grav.*

AROTES, *Grav.*

1. albicinctus, *Grav.*

OEDEMATOPSIS, *Tschek.*

1. scabricula, *Grav.*
2. Ops, *Morl.*

DIADEGMA, *Morl.*

1. anomala, *Morl.*

THYMARIS, *Först.*

1. pulchricornis, *Brisch.*
2. fenestralis, *Morl.*
3. fasciata, *Bridg.*

APHANOROPTRUM, *Först.*

1. ruficornis, *Grav.*

Tribe. **BANCHIDÆ**BANCHUS, *Fab.*

1. variegator, *Fab.*
2. pictus, *Fab.*

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3. volutatorius, *Linn.*
4. moniliatus, *Grav.*
5. falcator, *Fab.*

EXETASTES, *Grav.*

1. cinctipes, *Retz.*
2. nigripes, *Grav.*
3. guttatorius, *Grav.*
4. femorator, *Desv.*
5. laevigator, *Vill.*
6. aethiops, *Grav.*
7. fornicator, *Fab.*
8. calobatus, *Grav.*
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† I am indebted to Dr. T. A. Chapman for the synonymy of many of the Continental names.

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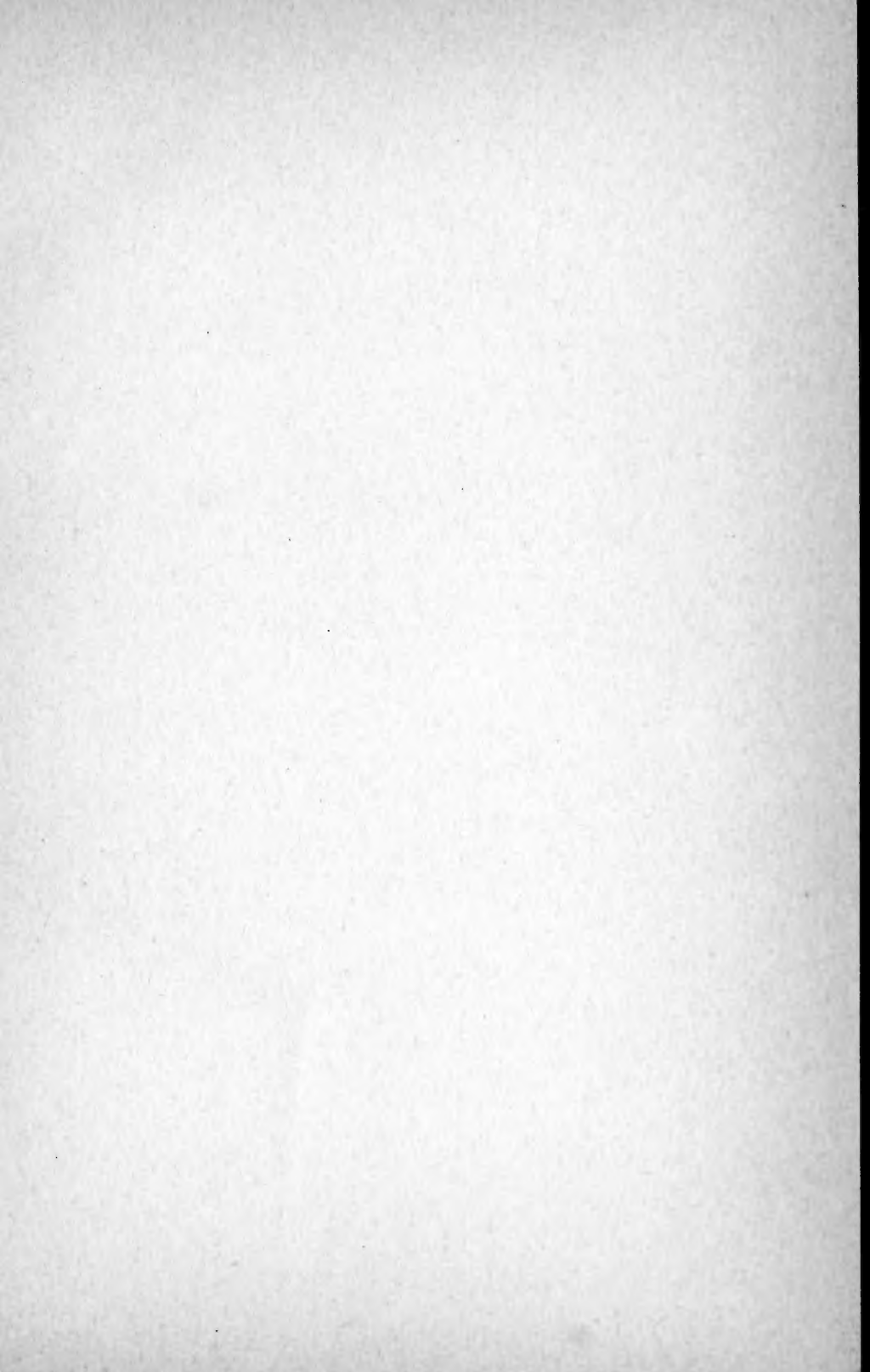
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